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The Consumption of Electricity.

LAST week a brief announcement was issued by the Electricity Commissioners, showing that the sale of electricity by authorised undertakings in Great Britain last year was 6,850 million kWh, an increase of 19.6 per cent. on the previous year's figures. We welcome this preliminary statement, anticipating probably by many months the issue of the annual report of the Commissioners, and evincing a desire to furnish the public with up-to-date information as promptly as possible; we hope this policy will be pursued whenever circumstances permit of it. The statement proceeds to point out that since 1920-21 the annual sale of electricity has practically doubled in amount, in spite of the fluctuating conditions of trade and industry during the past seven years.

These figures are very satisfactory; the increased sale of electricity necessarily connotes an increased demand for electrical apparatus of every description, the employment of additional labour in numerous industries, including coal mining, and improvement in the conditions of working and living of the whole community. In view of the fact that the sale of electricity actually fell off in 1921-22 by 11 per cent., the apparent rate of progress during the past five years has been even greater, but the Commissioners quite rightly have taken a more nearly normal year for the comparison.

In dealing with annual statistics of this kind, it is important to remember that the "compound interest rule" must be employed—otherwise the results are highly misleading. With an annual increase of 15 per cent., an amount is doubled every five years. The actual increase since 1920-21, if it had been uniform, would have been at the rate of 12 per cent. The annual percentages, in fact, have been, from 1921 to 1927 (calendar years),—12, +19, +15.1, +10.5, +3.8, and +19.6. No small part of the good result of 1927 is doubtless due to recovery after the abnormally bad year 1926—the year of the general strike and the coal dispute; other contributory causes are the gradual improvement in industrial conditions, the settlement of

the national scheme for electricity supply (the uncertainty as to which undoubtedly exercised a strong retarding influence in 1926), and, on the other hand, the development of the domestic load, brought about partly by the publicity afforded to the uses of electricity by the Parliamentary proceedings, and partly by the efforts of supply authorities to make up for the stagnation of the power load.

Whatever the general public may suppose, the fact remains that this notable increase in the use of electricity owes nothing at all to the operation of the Electricity (Supply) Act of 1926, which so far has not affected the supply of electricity. Had progress taken place at what we may call the normal rate of 12 per cent. during the two years 1926 and 1927, the output in the latter year would have been almost exactly the same as it actually was. The consumption of electricity from public sources of supply has now reached 150 kWh per head of population, and if the annual consumption of electricity generated by private installations (officially estimated in 1923-24 at 100 kWh per head) has also increased at the rate of 12 per cent per annum, the total is now 290 kWh per head per annum. At the same rate of progress the figure of 500 kWh made famous by the Weir Committee would be reached in the ordinary course in 1932—without the aid of the Act of 1926.

Earthing and the Public.

THE subject chosen by Mr. W. R. Rawlings for his paper at the E.C.A. Conference last week, was one of interest and importance to a very wide audience—not only to electrical manufacturers, contractors, and supply authorities, but also to the users of electricity, of all sorts and conditions. With much that he says we can cordially agree: but there is much also from which we must dissent. Broadly, our view is that electricity as ordinarily used is no more dangerous than steam, gas, oil, and other common agencies—probably far less so—and that whilst every reasonable precaution should be taken in order to reduce the risk to a minimum, to abolish it wholly is an unattainable ideal. Where local conditions increase the danger, in a factory, for instance, extra safeguards should be provided, just as smoking in a petrol store is forbidden; where the risk is small, it is not reasonable to adopt so stringent a safety code. Not long ago a life was lost owing to the disconnection of an earthing wire in a private house; many deaths have occurred from a similar cause in workshops, and no matter what precautions are taken in the first instance, there can be no certainty that they will long remain effective. They may even introduce additional dangers, of which fact the fatalities recorded as directly due to the use of guard wires on overhead lines are striking instances, and the author himself, endorsing our view with regard to the uncertainty of earth connections, believes that many fires have been due to earth wires that were either faulty or too small for the work they had to do.

Whilst there is no need to exaggerate the risks attending the use of electricity, we never suppress facts of this kind, and we heartily endorse the principle on which Mr. Rawlings lays stress: "It is the duty of all those engaged in the electrical industry to safeguard the public and to point out where dangers exist"; so far as the domestic installation is concerned, we believe the best safeguard is good workmanship and material. As Mr. W. Cross pointed out, there are many bad installations, but few accidents. Where good work is put in, accidents are almost unknown, and as Mr. Cross also remarked, manufacturers experience no demand for earthing devices on appliances.

There are two features which we frequently observe in discussions of this nature; one is the lack of discrimination, the other a craving for compulsion. Mr. Rawlings in writing his paper clearly had in mind primarily the domestic consumer, but quotes freely from Mr. G. Scott Ram's reports on electricity in factories; we suggest that consumers should be classified under different categories, according to the conditions obtaining, and that the respective risks should not be confused as they so often are. The desire for compulsion is constantly cropping up nowadays, especially in political relations; we do not deny that where the public welfare is at stake a measure of compulsion is essential in a civilised State, but we would limit the adoption of this principle to the minimum, and leave the individual as much liberty as possible. The idea of compulsory inspection of private installations, after the manner of factories and workshops, is distasteful.

Electric Wood-Working Machines.

IT is rather surprising that so many well-equipped wood-working machine shops should still be belt-driven from one line shaft. At a shipbuilding yard in the North of England, in which, in the carpenter's shop, all the machines are electrically driven, it is stated by the manager of the department that from every point of view the electric drive has proved better than the line shaft it has displaced. In this shop each machine is individually driven, and this seems to be the most satisfactory method, especially in shops where the machines are not in continuous use, but are auxiliary to bench work.

The very high speeds at which the majority of wood-working machines have to run entail, in the case of belt-driven machinery, a very great loss of power owing to belt slip, &c., and the expense due to wear and tear on the belts is also very heavy. Electrically-driven machines avoid waste of space also, because they can be placed close together and in the most suitable positions. Where long timber is to be worked, the absence of belts keeps the floor space clear near the machines, giving better working conditions and greater safety to the operator. To provide for the high speeds it is advantageous, in a.c. installations, to use a frequency-changer giving a high frequency for directly-coupled motors.

In some wood-working shops, overhead shafting has been replaced by under-floor shafting to keep the floor space clear, but this is only partly satisfactory, because a broken belt, or pulley trouble, necessitates interference with machine operations.

Imperial Communications.

A SOMEWHAT sensational feature of the week's news has been the announcement that the Imperial Wireless and Cable Conference has finished its inquiry, and has unanimously decided to put forward certain recommendations which, according to apparently inspired "forecasts" in the daily Press, are of a novel, if not revolutionary, character. These are abstracted elsewhere in this issue. Apparently the scheme drawn up by the Conference involves the formation of a great "Communications Company" to which will be entrusted the control and operation, not only of the privately owned cable and wireless systems of the Empire, but also of those owned by the Home and Oversea Governments, including the cables of the Pacific Cable Board. The Company will, it is proposed, include on its Board of Directors representatives of the various important interests concerned, and will be administered on the lines of private ownership, subject to "semi-public control." In addition there will be another company, which will take over the manufacturing and other functions of the companies that are "merged," and an Advisory Board to deal with questions of extension, rates charged, &c.

The report of the Conference will remain secret until its publication is authorised by the Government. Whilst we heartily welcome the evidence that the matter is being dealt with on broad and enlightened lines, we will defer our comments until the details are available.

Institution of Electrical Engineers.

An account of the Summer Meeting at Glasgow and Edinburgh, and in the West Highlands.

(*Concluded from page 6.*)

ON the third day of the tour the party departed from Glasgow on the Thursday morning (June 28th) by special train on an excursion to the West Highlands. The line at first follows the estuary of the River Clyde, but soon the view down Loch Long and the entrance to Loch Goil beyond was a foretaste of the quality of the scenic prospect, with the bonnie banks of Loch Lomond a mile or so further on. Above Tyndrum an impressive sweep round the hillside brought the line on to the desolate Rannoch Moor, over parts of which the track is supported on brushwood embedded in the yielding peat moss. The next stretch of hill water reached was the upper end of the Blackwater reservoir, which provides power for the Kinlochleven aluminium works, and five miles further north is Loch Ossian, the highest in Britain, 1,269 ft. above sea level (the summit of the railway line reaches 1,900 ft.). Loch Treig was regarded with a professional eye, for it is the main contributor to the Lochaber hydro-electric scheme referred to overleaf (see also fig. 15).

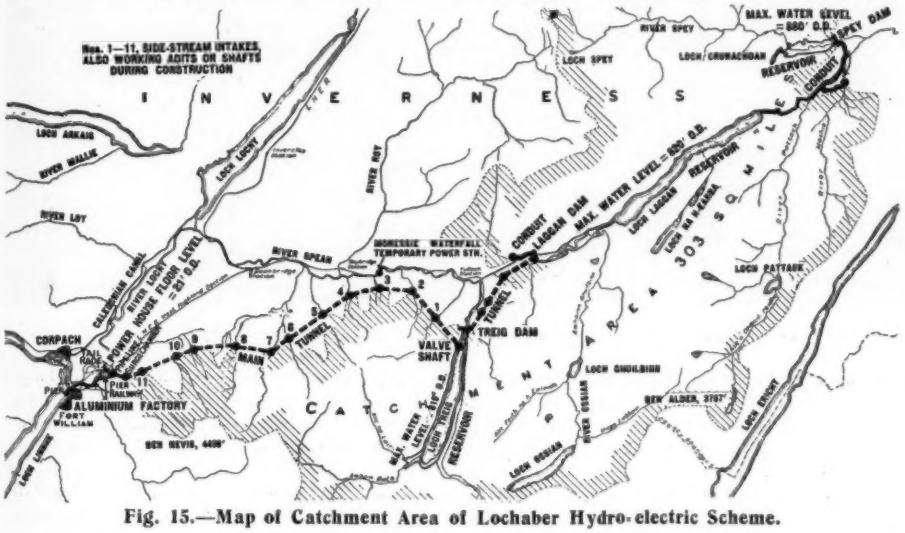

Fig. 15.—Map of Catchment Area of Lochaber Hydro-electric Scheme.

At Tulloch a halt was made for a picnic luncheon enterprisingly served, despite much rain, by the British Aluminium Co., Ltd., and Messrs. Balfour, Beatty and Co., Ltd., who also facilitated the more hardy spirits visiting Fersit to inspect sections of the tunnel being driven through the Ben Nevis range. The special train reached Fort William in time for tea, after which the work in progress at the power-house site was inspected. After dinner the liberality of our hosts, Mr. W. Murray Morrison and Mr. Geo. Balfour, enabled dancing at the Highland Hotel to be indulged in until the early hours of the morning, not forgetting the eightsome reel to the skirl of the pipes.

British Aluminium Co., Ltd.

Formed in 1894, the company commenced operations in 1896 with the Foyers Falls installation on Loch Ness, Inverness-shire, close to the eastern end of the Caledonian Canal, north of Fort William. At that time the world production of the metal was less than 2,000 tons per year, whereas to-day it is over a hundred times as much. In 1909 the Kinlochleven works, Argyllshire, were brought into use; their main features[1] are a dam 0.75-mile long and 86 ft. high, which impounds the River Leven, forming a lake 7.5 miles long and containing over 20,000 million gallons of water, which flows five miles through conduit and steel pipes to the turbo-generators at the head of Loch Leven, into which the water is finally discharged. The turbines operate at a head of about 1,000 ft., corresponding to a static pressure of 400 lb. per sq. in., driving d.c. generators in pairs, each set producing 8,000 amperes at 250 volts.

Mr. A. Page (president) seated in centre with Mr. S. E. Bastow (managing director) on his right and Prof. G. W. O. Howe on his left.

Fig. 16.—I.E.E. Visitors to Works of Messrs. Bruce Peebles & Co., Ltd., Edinburgh.

[1] See also ELEC. REV., June 9th and 16th, 1922, pp. 796 and 834.

The metal is produced by the electrolysis of aluminium oxide dissolved in a molten flux, the passage of heavy current between the carbon electrodes of the reduction furnaces keeping the electrolyte molten and, at the same time, splitting up the oxide into its components; the molten metal is deposited at the bottom of the furnaces, whence it is drawn off and cast into moulds. In addition, auxiliary services of considerable magnitude are needed; for instance, the aluminium oxide used must be exceptionally pure, its separation from the impurities in the imported bauxite (ore) being carried out at the company's alumina works at Burntisland, on the Firth of Forth, and at Larne, in North Ireland; also, a prominent feature of the Kinlochleven works is the separate factory that manufactures high-grade carbon electrodes in quantity. The metal ingots are shipped to the company's other works at Warrington in Lancashire and at Milton in Staffordshire, for conversion into rolled sheets, extruded bars, drawn wire, or mixed with other metals to form alloys of special properties, suitable for industrial requirements.

[Photo by] **Fig. 17.—Official I.E.E. Group Photographed on the Lawn at the Hydro-electric Station—**

Lochaber Hydro-Electric Scheme.

This scheme, which was sanctioned by Act of Parliament in 1921, is the third water-power development undertaken by the British Aluminium Co., Ltd., and, when completed, the new works will be capable of producing at least double the present output of aluminium in Scotland. The Lochaber power house and factory site is one mile north-east of Fort William, Inverness-shire, and will have an output of 100,000 e.h.p. continuously, or three times that of the Kinlochleven plant, which is located some 20 miles to the south-east (see fig. 15). The catchment area is 303 sq. miles, and the rainfall varies considerably; at the western end, at the top of Ben Nevis, the average is 160 in., and at the northern end of the area, some 33 miles from Ben Nevis, the average is 50 in. annually; the works are designed to deal with a flow of 1,600 cu. ft. per second. The flood waters of the Spey over a fixed amount of 40 million gallons per diem are to be diverted from the river to Loch Laggan.

The River Spey dam, 30 ft. high and 900 ft. long, situated two miles above Laggan Bridge, and forming a reservoir two miles in length, will regulate and divert the flood waters of the river across the watershed to the River Pattack. The River Mashie will also be tapped by means of an intake, the water being led to the conduit running from the Spey dam to the River Pattack. Lochs Laggan and Treig form the main reservoirs of the scheme; the area of the former will be extended by dredging the present outlet and constructing a dam some four miles downstream in the River Spean, making the total length 10 miles. The Laggan dam will be 550 ft. long and 45 ft. high; the level of the loch will not be raised, but the water will be drawn down to a maximum depth of 16 ft. A third dam, 440 ft. long, is to be built at the outlet of Loch Treig to raise its level by 40 ft. The intake of the tunnel leading to the power house is 100 ft. below the present water level, and thus allows a variation of 140 ft. for storage purposes. Loch Treig is 5 miles long, with an average width of half-a-mile, and is 800 ft. above sea level.

Fig. 18.—A Group Aboard R.M.S. "Iona."

Fig. 19.—A Luncheon Party at Tulloch.

The two reservoirs will be connected by a pressure tunnel 16 ft. in diameter and 4 miles long, and the combined capacity of the reservoirs will be 9,240 million cu. ft. From Loch Treig a pressure tunnel of a mean diameter of 15 ft. will convey the water to a surge chamber

near the top of the pipe line, 15 miles distant. The location of the tunnel follows the general contour of the mountain side in order to facilitate construction. Eleven streams crossing the line of the tunnel are to be tapped and the water passed into it through shafts. The total length of the 7 adits is 6,360 ft., and the maximum length of one is 1,440 ft. The total depth of the 5 shafts is 1,030 ft., and the maximum depth of one 356 ft. adits varying in length from 420 to 1,440 ft., and one open end at the top of the pipe line. It is being cut out of the solid rock entirely, with the aid of compressed-air drills and blasts of 150-lb. charges of lyddite buried 8 ft. deep. The excavated material is hauled out by electric battery locomotives, and much of the granite is crushed for concrete mixing; the tunnel is concrete faced.

Workmen's camps are situated at each of the shafts and adits, accommodating over 2,000 men, together with recreation huts, hospitals, &c. Transport is effected by a narrow-gauge railway running from end to end of the works, a distance of 20 miles, and electric light and power for tunnelling and other machinery is obtained from a temporary water-power station that has been erected at Monessie Falls, where the head is 100 ft. The generators have an output of 5,000 h.p., and an 11,000-volt overhead transmission line extends throughout the works with transformers placed at each point of operation. A telephone service maintains communications between all parts of the works.

—at Bonnington and Corra Linn Falls, Lanarkshire; Clyde Valley Electrical Power Co. [*Brown, Lanark.*

Owing to the high rainfall on the area traversed by this tunnel, the water collected by the shafts will be an important percentage of the total run-off. At the surge chamber, which is 220 ft. in depth and 30 ft. in diameter, the tunnel bifurcates to the top of the pipe line where two groups of three steel pipes, 5 ft. 6 in. in diameter, will lead to the power house. The pipe line is 3,200 ft. in length, and will be controlled by automatic valves. In order to take full advantage of the head available, the power house has been sunk some 40 ft. below ground level, the turbine pits and tail race being still deeper; access to the power house will be obtained by means of an inclined rock cutting.

The maximum head at the impulse turbines will be 800 ft., and the total capacity of the generators 120,000 h.p., which is equivalent to some 15 million tons of coal per annum; initially, however, the capacity will be 50,000 kW, with two pipe lines. The tail race will discharge into the River Lochy below the Mallaig railway bridge, and will have a length of 3,000 ft., 2,000 ft. of which is open cut and the remainder tunnel; it crosses under the L. & N.E. Railway twice and the main public road once, concrete bridges having been constructed for this purpose.

The extensive aluminium factories will adjoin the power house, at a level of 34 ft. above the power-house floor; they will be served by a railway connected to a reinforced-concrete pier which has been constructed at the head of Loch Linnhe, the depth of water alongside being sufficient for ocean-going vessels. It will be used for the importation of alumina from Ireland and the export of aluminium; at present it is being utilised for the transport of tunnelling requisites, all of which have to be carried up the mountain side. The main tunnel is being driven from 23 faces, of which 8 are operated from shafts varying in depth from 200 to 356 ft.; and 14 from horizontal

Fig. 20.—Messrs. J. Taylor, A. Lindsay and D. M. Macleod at Queensferry.

Fig. 21.—Messrs. W. Wilson, J. M. Donaldson, J. Murray and C. Stewart aboard R.M.S. "Iona."

The scheme was initiated by Mr. W. Murray Morrison, M.Inst.C.E., director and general manager of the British Aluminium Co., Ltd., and its associated companies; its general design and lay-out were due to the late Mr. C. S. Meik, M.Inst.C.E., succeeded by Mr. W. T. Halcrow, M.Inst.C.E., of Messrs. C. S. Meik and Buchanan, consulting engineers for the civil engineering works, with whom is associated Mr. W. J. E. Binnie, M.Inst.C.E. The designs of the power plant and factories are being carried out under the direction of Mr. Murray Morrison, Mr. J. S. Bliss, technical manager, and Mr. A. S. Kinnear (architect), of the British Aluminium Co., Ltd. The principal contractors for the civil engineering works are Messrs. Balfour, Beatty & Co., Ltd.; for the pressure-pipe line, the South Durham Steel and Iron Co., Ltd.; for the valves, Messrs. Glenfield

and Kennedy, Ltd.; and for the gates, Messrs. Ransomes and Rapier, Ltd. The English Electric Co., Ltd., is supplying all the main turbines and generators, and the Metropolitan-Vickers Electrical Co., Ltd., and Boving and Co., Ltd., are supplying the subsidiary turbines and generating plant. Some £1,500,000 has been expended on excavation, tunnelling, and the pipe lines, the scheme being probably the largest of its kind in the British Isles, and it is being assisted to the extent of £2,000,000 under the Trade Facilities Act.

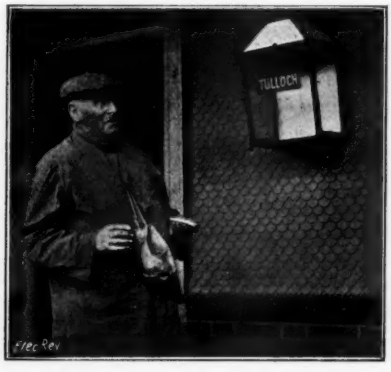

Fig. 22.—Mr. R. A. Chattock Lunches at Tulloch.

Fig. 23.—Messrs. J. E. Sayers, J. Taylor, A. Lindsay and W. L. Winning at Forth Bridge.

The Blarmachfoldach Plant.

Mr. A. S. McWhirter (consultant) cordially invited the visitors to inspect the water-power station of the Fort William Electric Lighting Co., which, having no statutory power, operates by agreement with the Town Council. The turbines at Blarmachfoldach were supplied by Messrs. Gilbert Gilkes and Co., Ltd., in 1896, and have been the chief source of power. Their output now is in excess of that guaranteed, the generators coupled to them having been changed from two 40-kW Laurence Scott machines to two 60-kW G.E.C. machines. Shortly afterwards a third turbo generating set was installed at Fort William to take the surplus water from the town's supply, but owing to shortage of water a 40-h.p. single-cylinder oil engine was provided in 1903; it did not, however, prove satisfactory, and a Ruston & Hornsby 165-h.p., 5-cylinder, solid-injection, cold-starting oil engine, coupled to an E.C.C. 100-kW generator for direct d.c. 3-wire supply, or battery charging, has just been installed. The supply to consumers commenced in the autumn of 1896, and in spite of trouble with ice in the winter, occasional shortage of water due to frost or lack of rain, and damage by lightning, there has been no serious interruption of the supply during 32 years. Mr. J. Hope is the engineer, and d.c. is distributed by 3-wire underground and overhead lines to some 311 consumers at 300 V for power purposes and 150 V for lighting. The overhead line between the Blarmachfoldach and town stations operates at 560 V, and the 164-cell Pritchett & Gold battery is of 300 Ah capacity.

The Loch Cruise.

On Friday morning (June 29th) most of the party boarded the R.M.S. *Iona* for a sail on the Western Seas. Had the weather been fair it would have been hard to turn southwards down Loch Linnhe from Fort William, away from Loch Eil, Morar, and the magic Isle of Skye to the west

Luncheon and tea were served on board, Oban pier being reached before dinner. There the soft Gaelic tongue was heard spoken for one more evening before dispersing south by rail and road.

In Conclusion.

The accompanying illustrations will serve as a pleasant reminder of a successful tour, well planned, and thoroughly enjoyed by most, despite the perversity of the elements. Its organisation was no mean work, and Mr. J. Taylor (hon. secretary and treasurer of the Scottish Centre) deserved special thanks, for his task was by no means light. Scarcely less are we indebted to Messrs. D. M. Macleod, E. T. Goslin, Alex. Lindsay, D. S. Munro, P. F. Rowell (I.E.E. secretary), A. E. Rayner, and the reception committee of ladies, all of whom contributed so much towards the success of the occasion.

Institution of Electrical Engineers.

Conversazione.—A large gathering of members with their ladies and official guests attended the annual conversazione of the Institution of Electrical Engineers on Thursday evening, July 5th, which was held as usual at the Natural History Museum, South Kensington, London. Following the reception by Mr. Archibald Page (president of the I.E.E. and chief engineer of the Central Electricity Board) and Mrs. Page, who were supported by members of the I.E.E. Council, a programme of music was performed by the string band of H.M. Royal Engineers in the Central Hall, and in addition a vocal and instrumental concert was provided in the Reptile Gallery by the following artistes: the Misses Linda Seymour and Flora Woodman and Messrs. W. H. Squire, Peter Dawson, and Edward Brightwell. Light refreshments were daintily served throughout the evening.

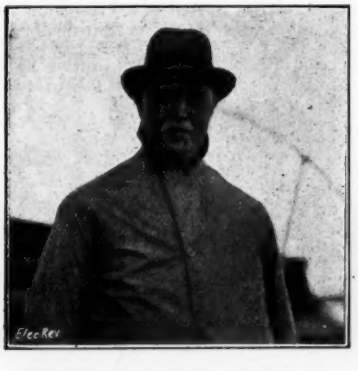

Fig. 24.—Prof. Magnus Maclean, D.Sc.

Fig. 25.—Mr. J. Taylor, hon. secretary.

Fig. 26.—Mr. and Mrs. Ll. B. Atkinson, still smiling.

Goodwill.

How to Ascertain its Value.

(COMMUNICATED.)

GOODWILL is said to have no material existence; it depends upon certain things that have to be investigated separately, and is, therefore, very difficult to value.

Generally speaking, its value is taken to be the purchase of the average net profits over a period of, say, five years, but sometimes, in retail businesses, it is based upon the turnover. No strict rules can be laid down for the valuation of this asset, for the seller will have his own idea as to its worth, and the buyer will have his idea as to what he ought to pay for it. Very seldom will these two valuations coincide, and the debatable subject will usually be settled by compromise.

Here are a few legal dicta on the subject:—

"Goodwill is the benefit arising from connection and reputation."—Lord Justice Lindley.

"Goodwill is the probability of customers or clientele of the firm resorting to the person or persons who succeed to the business as a going concern."—Mr. Underhill.

"Goodwill is the probability that customers will resort to the old place."—Lord Eldon.

Goodwill is, therefore, a valuable asset in many cases, for it often represents the price of a life's work in a business. The buyer of a good business with such goodwill will seldom have to use any effort in searching for customers, for he enters in the benefit of the previous owner's work in this direction. A further note should be added here—namely, that in a business established over a number of years, say 30 or 40, the stock-in-trade is sure to consist, almost entirely, of those things that are in constant demand, for in the process of time goods that are never asked for, because they do not suit the district, are practically eliminated. In the course of these years it is possible that new lines have been bought from time to time, some of which have been a disappointment, and have had to be sold at a big reduction and finished with. The stock, therefore, of an old-established business will, in most cases, approach the "ideal" assortment, and certainly much more so than the stock of a new concern whose proprietor is a stranger to the district.

Purchase Value.

The price at which goodwill can be purchased will represent the cost of acquiring facilities for earning profits previously possessed by the vendor, and the right to stand in his place among the people with whom he did business. The following points should be kept in view by the would-be purchaser of goodwill, as they are likely to have some bearing upon the value that may be arrived at:—

(1) The amount of capital required and the probable return thereon.

(2) Whether the vendor intends to carry on a similar business, and where.

(3) The tenure of the premises, and if a renewal can be obtained upon the same terms.

(4) The number of customers, and if there has been much variation over given periods; if so, the cause of the variation.

(5) If advertising has been maintained within the last year or so, and the extent of it.

(6) A knowledge of the relation of "overhead charges" to the turnover of the business.

The precise nature of the business should then be studied, and answers to the following questions sought:—

(1) Is the trade, or any part of it, declining?

(2) Is the trade of the district declining? What is the future of the district?

(3) Is the trade "attached" to the district, or does the trade centre around the personality of the seller?

(4) What is the reason for the desire to sell the business?

A Few Pitfalls for Buyers to Avoid.

The vendor of a goodwill is debarred from starting another business and carrying it on in such a way as to give the public the impression that it is a continuation of the old business; but he can trade again, and in the same line of business. The purchaser should, therefore, protect himself by certain clauses in the agreement against any such competition. It is always an advantage to see that the word "goodwill" itself appears in the particulars of the property sold, so that there may be no doubt as to the fullness of the contract for transfer. This will be sufficient evidence of the fact that the goodwill was intended to be assigned.

Sometimes a "lump sum" is paid for the assets of a business in which goodwill is understood to be included, but such an arrangement may be the cause of a dispute later on. Apart from the possibility of such a dispute arising, it is always better to have all the assets valued and stated separately.

The values of some goodwills may be rather doubtful, but some are of real value, and it is quite a mistake for any one to take an attitude of hostility towards this asset. The question to be answered is: "Is the goodwill worth the price asked for it?" Investigations will usually give the answer. In a busy centre of a populous city someone may deem it better to buy the "stand" and put in a modern shop front with plenty of display, instead of paying a high price for the goodwill of any business. The success of such a procedure will greatly depend upon the style of the business started.

Its Real Value Depends upon Net Profits.

The value of goodwill has much to do with the profits—net profits—of the business, and a gradual rise of net profits may give the impression of prosperity as a continuous thing; but this may be only apparent. It might be possible to show a rise in net profit for the last year by the drastic cutting down of "running expenses." It is a very desirable thing to keep such expenses as low as possible, but beyond a certain limit there is liable to be a reaction. The full effects of this reaction may not be felt for some months.

Most accountants will agree that goodwill should not stand in the balance-sheet for a long time at too high a figure: they are likely to favour a policy of "writing it off" at so much per annum, over a period of perhaps seven to ten years. The amount so written off will be debited to profit and loss account, and credited to "goodwill" account. Where good profits are maintained or even increased, it might be regarded as a cheap method of obtaining additional working capital for the business, which would otherwise be distributed as dividend. Quite apart from what goodwill may figure at in the balance-sheet, the real value of it depends upon the profits of the concern. Profits are things that cannot be guaranteed, so it does seem advisable to "write off" as much as possible when profits are good, so that the financial position may be stronger in "bad times" if such should descend upon the business later. The "depreciation" of goodwill—if such an expression can be used—is not the same thing as the depreciation of a motor delivery van—an asset that is directly affected by "wear and tear." There is really no obligation to reduce the value of goodwill as an asset in the balance-sheet, it is merely a matter of commercial prudence.

Goodwill is apparently as good as a realisable investment so long as the concern is prosperous and the owner or owners receive a satisfactory return upon the capital invested. Goodwill cannot be easily comprehended as a thing apart from the business; it is part and parcel of a continuing business. Where this asset is combined with trade marks, designs, and patent rights, its value is considerably strengthened. The law recognises goodwill as a transferable asset, and in agreements for its sale or conveyance it is subject to *ad valorem* stamp duty. Goodwill is, therefore, a form of property.

Output, Load Factor and Efficiency.

Some observations and conclusions drawn from the recently issued returns of the Electricity Commissioners.

By FREDK. W. PURSE, M.I.E.E., M.I.Mech.E.

THE interesting articles on "Electricity Supply" by Mr. D. J. Bolton, which have appeared in the ELECTRICAL REVIEW, have been of absorbing interest to the writer, who has been equally keen on seeking to find "clues" from the Electricity Commissioners' analyses of fuel consumption, &c., for the year ended March 31st, 1927.

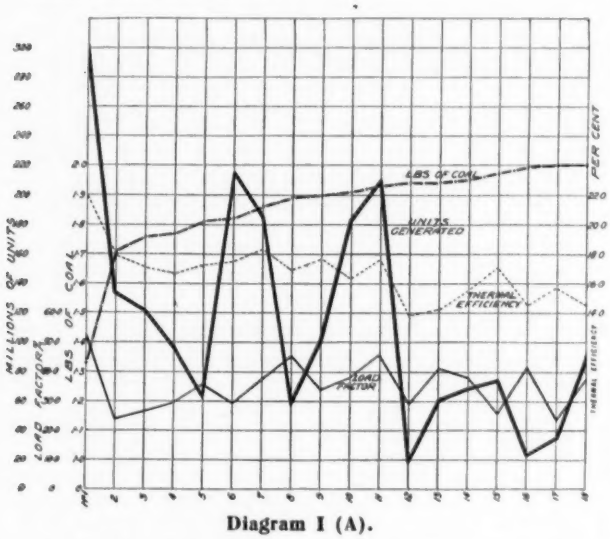

Diagram I (A).

With Mr. Bolton's first conclusion, *viz.*, "the wide divergence between individual stations even of the same size will be noticed," one is bound to entirely agree; as to his second conclusion, *viz.*, "there is a very marked decrease in the coal consumed per unit with increasing size of station," it would appear that he had fastened on the correct feature, namely, the size of station as being the controlling factor, but it is a little doubtful if quite so definite a statement as to there being a *marked decrease* can be supported.

With the object of investigating what connection, if any, exists between output, coal consumption and load factor, the writer extracted from the Electricity Commissioners' Returns referred to above a list of all the coal-consuming stations whose consumption did not exceed 2 lb. per unit; the names of the stations are immaterial, and they are therefore numbered and shown in Table I (A) in order of coal consumption. In Table I (B) they are re-arranged in order of output, and in Table I (C) they are shown in order of load factor. The diagrams I (A), I (B) and I (C) correspond to the respective tables, and several interesting facts emerge from a consideration of these tables and diagrams. For example, stations 5 and 13, with practically the same output, show that the better load factor has the poorer coal consumption and efficiency; one or two other comparisons are on similar lines. The figures for thermal efficiency are included, and they show that only very generally do they follow the figures of lb. of coal per kWh of energy generated.

An examination of these figures does not show any reliable relation between load factor and fuel efficiency; there is a tendency towards an increase in fuel efficiency

TABLE I (A).
1926-27.

No.	Units generated.	Lb. coal per unit.	L.F.	Thermal efficiency.
1	300,771,400	1.33	53.2	21.83
2	133,388,110	1.71	24.2	17.9
3	120,785,153	1.76	26.5	17.14
4	97,309,200	1.77	29.4	16.68
5	62,659,178	1.81	35.5	17.3
6	215,311,400	1.82	29.2	17.46
7	184,794,610	1.86	37.6	18.33
8	57,830,100	1.89	45.2	16.95
9	100,171,125	1.9	33.6	17.62
10	183,755,400	1.91	37.9	16.33
11	209,385,300	1.93	45.9	17.6
12	18,996,420	1.94	29.4	13.72
13	61,571,084	1.94	41.3	14.18
14	69,780,230	1.95	38.6	15.51
15	74,832,640	1.97	26.0	17.16
16	23,937,030	1.99	41.9	14.49
17	34,719,962	2.00	23.8	15 78
18	90,134,540	2.0	37.8	14.58

TABLE I (B).
1926-27.

No.	Units generated.	Lb. coal per unit.	L.F.	Thermal efficiency.
12	18,996,420	1.94	29.4	13.72
16	23,937,030	1.99	41.9	14.49
17	34,719,962	2.00	23.8	15.78
8	57,830,100	1.89	45.2	16.95
13	61,571,084	1.94	41.3	14.18
5	62,659,178	1.81	35.5	17.30
14	69,780,230	1.95	38.6	15.51
15	74,832,640	1.97	26.0	17.16
18	90,134,540	2.0	37.8	14.58
4	97,309,200	1.77	29.4	16.68
9	100,171,125	1.9	33.6	17.62
3	120,785,153	1.76	26.5	17.14
2	133,388,110	1.71	24.2	17.90
10	183,755,400	1.91	37.9	16.33
7	184,794,610	1.86	37.6	18.33
11	209,385,300	1.93	45.9	17.60
6	215,311,400	1.82	29.2	17.46
1	300,771,400	1.33	53.2	21.83

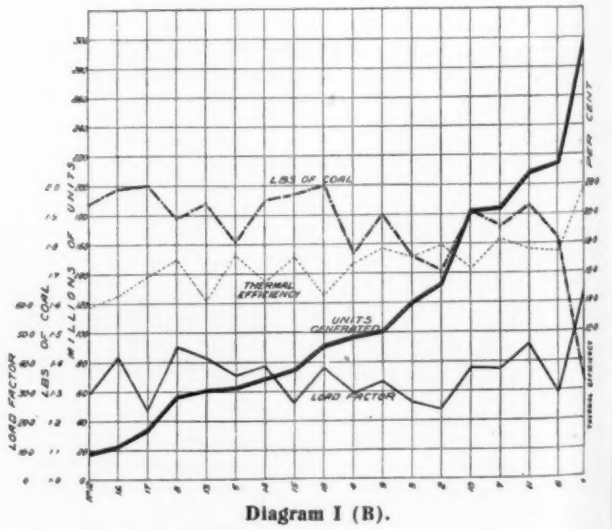

Diagram I (B).

with increased output, and that is as far as one can go. It may be suggested that the large number of stations

TABLE I (C).

1926-27.

No.	Units generated.	Lb. coal per unit.	L.F.	Thermal efficiency.
17	34,719,962	2.0	23.8	15.78
2	133,388,110	1.71	24.2	17.9
15	74,832,640	1.97	26.0	17.16
3	120,785,153	1.76	26.5	17.14
6	215,311,400	1.82	29.2	17.46
4	97,309,200	1.77	29.4	16.68
12	18,996,420	1.94	29.4	13.72
9	100,171,125	1.9	33.6	17.62
5	62,659,178	1.81	35.5	17.3
7	184,791,610	1.86	37.6	18.33
18	90,134,540	2.0	37.8	14.58
10	183,755,400	1.91	37.9	16.33
14	69,780,230	1.95	38.6	15.51
13	61,571,084	1.94	41.3	14.18
16	23,937,030	1.99	41.9	14.49
8	57,830,100	1.89	45.2	16.95
11	209,385,300	1.93	45.9	17.6
1	300,771,400	1.33	53.2	21.83

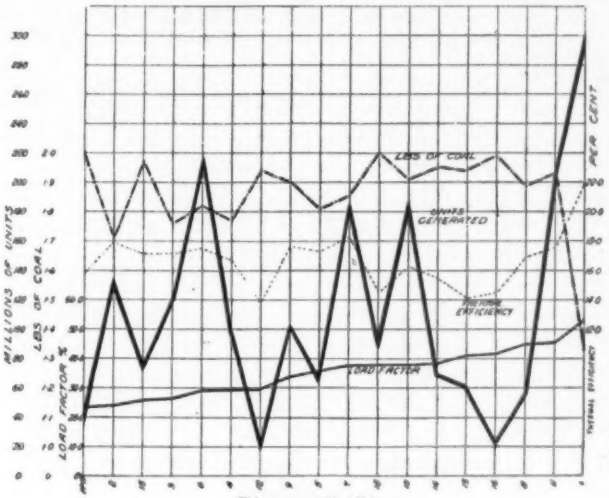

Diagram I (C).

omitted are smaller with higher fuel consumptions, but the omissions will be found to contain the same relative

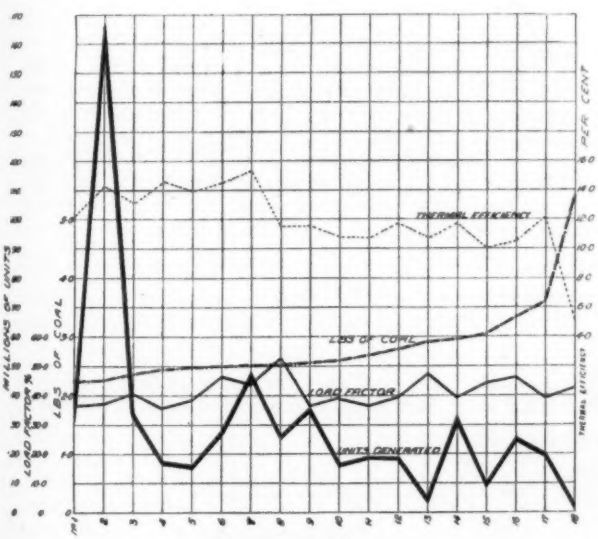

Diagram II (A).

number of large and small stations as the inclusions, so that the deduction is claimed to be a fair one.

TABLE II (B).

1926-27.

No.	Units generated.	Lb. coal per unit.	L.F.	Thermal efficiency.
18	1,947,296	5.39	42.7	5.75
13	3,943,546	2.92	47.6	10.71
15	9,765,800	3.05	44.5	10.01
5	15,931,509	2.47	38.6	13.92
10	16,485,430	2.59	38.8	10.78
4	17,331,100	2.44	35.9	14.54
12	18,933,900	2.78	39.7	11.75
11	18,984,560	2.68	36.7	10.71
17	19,722,620	3.59	39 1	12.09
16	25,390,300	3.32	46.3	10.47
8	25,952,240	2.52	52.2	11.48
6	27,985,440	2.49	46.2	14.43
14	33,291,730	2.96	39.5	11.78
3	33,662,200	2.36	40.8	13.12
1	33,873,546	2.24	36 4	12.27
9	35,588,527	2.56	36.1	11.56
7	47,782,390	2.51	43.6	15.22
2	166,130,900	2.26	37.2	14.22

As a further investigation, a second list of stations has been extracted which have a load factor in excess of 35 per cent., and these are shown in Tables II (A), II (B), and II (C), in the same order as in the previous

TABLE II (A).

1926-27.

No.	Units generated.	Lb. coal per unit.	L.F.	Thermal efficiency.
1	33,873,546	2.24	36.4	12.27
2	166,130,900	2.26	37.2	14.22
3	33,662,200	2.36	40.8	13.12
4	17,331,100	2.44	35.9	14.54
5	15,931,509	2.47	38.6	13.92
6	27,985,440	2.49	46 2	14.43
7	47,782,390	2.51	43.6	15.22
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13	3,943,546	2.92	47.6	10.71
14	33,291,730	2.96	39.5	11.78
15	9,765,800	3.05	44.5	10.01
16	25,390,300	3.32	46.3	10.47
17	19,722,620	3.59	39.1	12.09
18	1,947,296	5.36	42.7	5.75

tables, with corresponding diagrams. Here again it will be seen that load factor shows no relation whatever

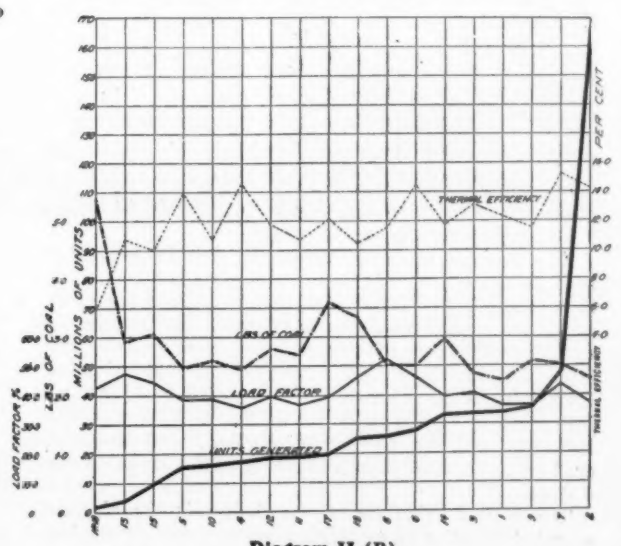


Diagram II (B).

to fuel efficiency, but as in the first comparison there is an indication of improved fuel efficiency with an increase in output.

A still more interesting fact will be noticed from a comparison of the two sets of tables, *viz.*, that although

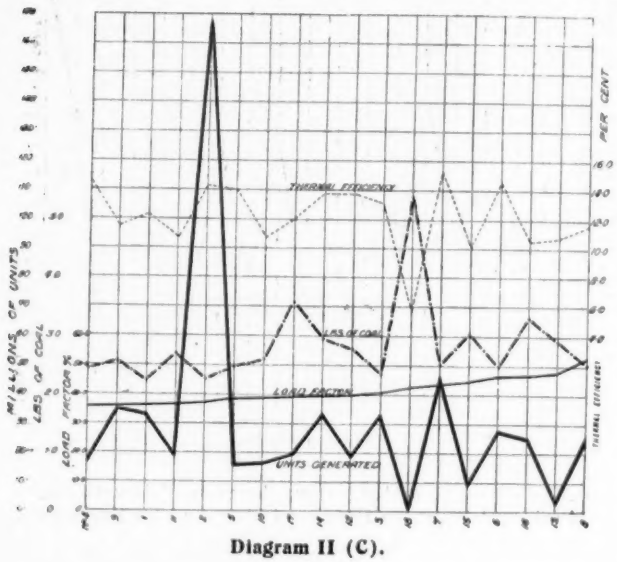


Diagram II (C).

the first set of tables represents a group of the best fuel efficiency stations, their load factor is, on the whole, appreciably less than that of the second set of tables, which has a much poorer fuel efficiency. A similar feature appears in the second set of tables as in the first set, *viz.*, that stations with practically the same output show a poorer fuel efficiency with a better load factor.

The only general conclusion, therefore, that seems possible is that the size of the station appears to have a greater dominating influence over the fuel efficiency than the load factor. The writer does not, however, submit this conclusion as one that can be generally acted upon, since he is aware of the many pitfalls to be avoided, as the instant thought it suggests is why not *one* station for the whole of the country?

TABLE II (c).

1926-27.

No.	Units generated.	Lb. coal per unit.	L.F.	Thermal efficiency.
4	17,331,100	2.44	35.9	14.54
9	35,788,527	2.56	36.1	11.56
1	33,873,546	2.24	36.4	12.27
11	18,984,560	2.68	36.7	10.71
2	166,130,900	2.26	37.2	14.22
5	15,931,509	2.47	38.6	13.92
10	16,485,430	2.59	38.8	10.78
17	19,722,620	3.59	39.1	12.09
14	33,291,730	2.96	39.5	11.78
12	16,933,900	2.78	39.7	11.75
3	33,662,200	2.36	40.8	13.12
18	1,947,296	5.39	42.7	5.75
7	47,782,390	2.51	43.6	15.22
15	9,765,800	3.05	44.5	10.01
6	27,385,440	2.49	46.2	14.43
16	25,390,300	3.32	46.3	10.47
13	3,943,546	2.92	47.6	10.71
8	25,952,240	2.52	52.2	11.48

Many facts, conditions and circumstances, well known to all, have to be taken into consideration, and whilst bearing in mind the general laws which apply, the one aim to be borne in mind is "cost to the consumer"; he should not be called upon to pay more for his electricity in order that the generating station supplying him may boast of being the largest or most efficient. The measure of cheap electricity is at the lampholder and not at the bus-bar.

Cheap Overhead-Line Construction.

An Unusual Type of Pole for Rural Lines.

By R. BORLASE MATTHEWS, Wh.Ex., A.M.Inst.C.E., M.I.E.E., F.R.Ae.S.

THERE are more ways than one of constructing an overhead line. Whereas standard commercial sections of angle steel are used in the construction of steel towers, where wood has been employed it has hitherto been the custom to use the natural tree trunk with the bark stripped off. However, a new and very economical method, employing commercial sawn timber, has been developed by the Young Electric Company (the owner and manager of which is also a farmer) near Sherwood, Oregon, U.S.A. It has, in fact, been in use there for over four years, so it may be said to have passed the experimental stage.

As a demonstration of what can be done in this direction, an example of this type of construction has recently been erected upon the all-electric farm of the author at East Grinstead. The author's attention was first drawn to this interesting novelty through a communication from the American Committee on "the Relation of Electricity to Agriculture." This enabled him to get into touch by correspondence with Mr. D. S. Young, the inventor, and Mr. George W. Kable, an agricultural engineer, who has taken a great deal of interest in the matter.

The general principle of the design is the already accepted practice of employing stout stayed anchoring posts at quarter-mile intervals, with flexible intermediate supports*. The essence of the construction of the intermediate supports is the use of two 20- to 22-ft. sawn lengths of 4-in. × 2-in. cross-section creosoted fir. These are bolted together just above the centres with a $\frac{3}{8}$-in. diameter bolt to form an "X"-shaped frame, tied together at the top with another short cross-brace of similar section (see fig 1). The complete structure is mounted by means of two 2-ft. lengths of iron piping set in rot-proof footings which take the form of small reinforced-concrete blocks (figs. 1 and 2). The total weight of this flexible intermediate line support is under seventy-five pounds.

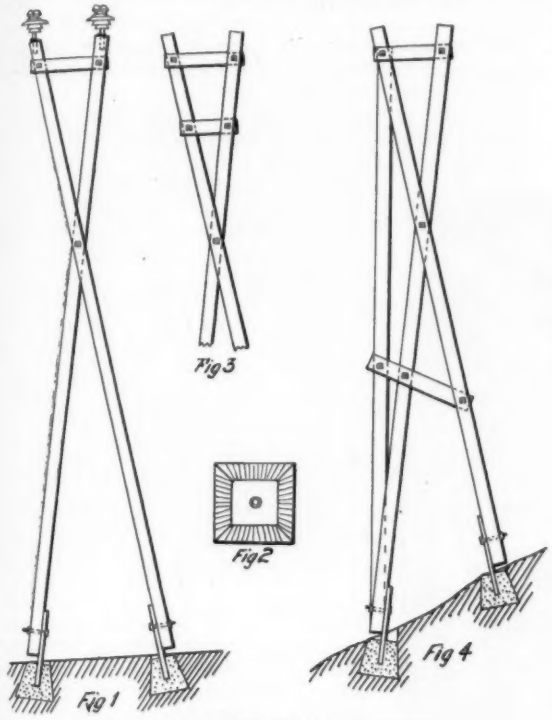
The cross member forms a tie to the "X" framework and also acts as a spacer for the insulators. The latter are of the pin type, and are screwed into the ends of the upper arms of the frame. The lengths of piping are pre-cast into pyramidal concrete blocks, each of about one cubic foot, which are lined up in position ready to take the "X" frames.

Where the direction of the line varies slightly, the frames are stiffened by a vertical length of timber which carries the side pull to the foundation blocks (fig. 4), and on the sharper bends a third anchor block is used, making the frame self-supporting. An additional cross

* See "Extra-High-Pressure Transmission Lines," by R. Borlase Matthews and C. T. Wilkinson, I.E.E. *Journal*, Vol. 46, Part 207, 1911.

brace is fitted where it is required to support a transformer (fig. 3).

At points where service taps are taken from the line, the transformer is hung to one side of the centre of the cross member, so that the weight of the transformer helps to balance the pull of the service wires.



Figs. 1 to 4.—Details of " X " Frames.

When it is necessary to use these frames on hill-sides, one of the legs is made longer to suit the slope of the ground, so that it becomes unnecessary to place the footings on the same level (fig. 4).

The anchor frames are placed at intervals of a quarter of a mile, at road or line crossings, at transformer points, and where the line changes in direction. These frames are made somewhat stouter, being of 3-in. × 4-in. timber, and they are anchored to concrete stay blocks with anchor rods, strain insulators, and ¼-in. guy ropes which are attached to the frame cross brace.

The usual procedure in erection is to line up the concrete footings in position ready to erect the " X " frames. The latter are transported to the job in a collapsed form, that is, without the top cross member being bolted up. The complete frame is then bolted up on the ground, the line wires are bound on to the insulators, and the frame is raised into position and bolted to the footing pipes, an operation which may easily be accomplished by two men.

Financially, this system has much to commend it. According to figures available from the erection of the latest line, about nine miles in length, the cost works out at something under £70 per mile for the single-phase rural lines already constructed. In view of various reports concerning this line, an official inspection was made by the Oregon Public Service Commission, after which it was stated that, as far as the Commission was concerned and as far also as the National Safety Code prescribed, all rules for rural lines were complied with by this form of construction.

The costs quoted below are those actually realised by the Young Electric Co. Some of the materials and certainly the labour would work out more cheaply here.

COSTS FOR " X " FRAME RURAL LINE CONSTRUCTION.

	Per mile. £ s. d.	Per 10 miles. £ s. d.
" X " Frames and Footings.—		
Timber (at £3 15s., £4, £4 10s. per 1,000)	6 9 0	64 10 0
Bolts	1 11 0	15 10 0
Washers	7 9	3 16 6
Footing pipe	3 12 11	36 9 2
Cement	2 13 5	26 14 2
Sand and gravel (at 11s. per yard)	1 13 4	16 14 4
	£16 7 5	£163 14 2
Overhead Line.—		
Wire (Nos. 8, 10 and 12 S.W.G.)	20 6 8	203 6 8
Insulators	1 3 4	11 13 4
Pins	2 15 1	27 10 10
Fuses	8 11	4 9 2
Clamps	10 0	5 0 0
Stays.—		
Stay cable	7 4	3 13 3
Anchor rods	1 3 6	11 15 0
Guy clamps	18 4	9 3 4
Strain insulators	1 4 5	12 4 2
Eye bolts	7 9	3 17 6
Reinforcing for anchor blocks	4 5	2 4 3
Total	£45 17 2	£458 11 8
Plus 10 per cent.	4 11 8	45 16 8
Total material cost	£50 8 10	£504 8 4
Total labour cost, including clearing, assembling, cement work at 5s. 6d. per hour, digging anchor holes at 5d. each, and two men erecting line at 18s. 6d. per day each	16 6 8	163 6 8
Insurance	18 4	9 3 4
Transport	16 4	8 3 4
Total cost	£68 10 2	£685 1 8

The following are the total costs of individual frames erected in place, including all labour and material, except that for clearing right of way and cost of line :—

	£ s. d.
Intermediate frame	1 5 0
Light angle and service drop frames	1 8 0
Heavy angle frames	1 16 0
Transformer and intermediate anchored frames	2 1 0
Terminal frames	2 11 0
Transformer and heavy angle frames	2 12 6

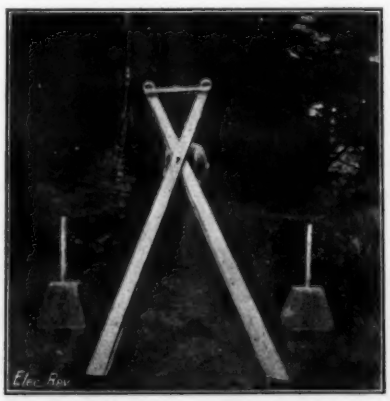


Fig. 5.—Components of " X "-frame.

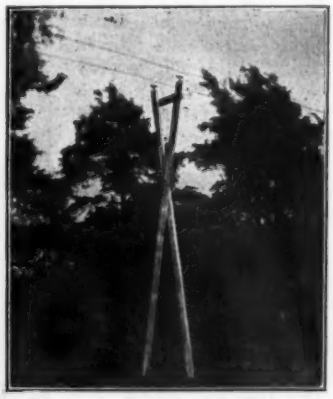


Fig. 6.—" X "-frame Erected.

The amount allotted for the overhead wire seems to be on the low side; however, it is understood that some galvanised steel wire was employed. It must be borne in mind that a considerable proportion of the cost of an ordinary pole is that of transport, first from the forest to the merchant's timber yard, thence to the nearest rail-head, and finally on to the site. Notwithstanding the expense of sawing, since the weight to be transported is less and the sawn timber packs better, it can, on this score, effectively compete with the natural tree trunks.

On July 18th this installation at East Grinstead is to be inspected by members of the Overhead Lines Association.

Electricity Supply in Battersea.

An Account of Recent Additions to the Electricity Works.

ON Saturday last the Mayor of Battersea, Ald. J. F. Lane, J.P., formally opened the extensions which have been carried out at the generating station in Lombard Street, Battersea, and started up the new 10,000-kW turbo-alternator; a large party of visitors, after hearing addresses by the chairman of the Electricity Committee (Councillor R. C. Kiloh), the Mayor, and other members of the Borough Council, was conducted round the generating station, and taken to the automatic sub-station at Lavender Hill, adjoining the Council's electricity showroom, where light refreshments were served. Electricity supply commenced in Battersea in the year 1901, under a provisional order granted to the Council in 1896; the three-wire d.c. system was adopted, at 230-460 volts, and steady progress was made, especially after the war—the sale of electricity having increased from twelve million kWh in 1921 to over 27 millions in 1927-28—whilst the maximum load has exceeded 12,000 kW. The average price obtained in 1927-28 was 1.52d. per kWh, a lower price than before the war.

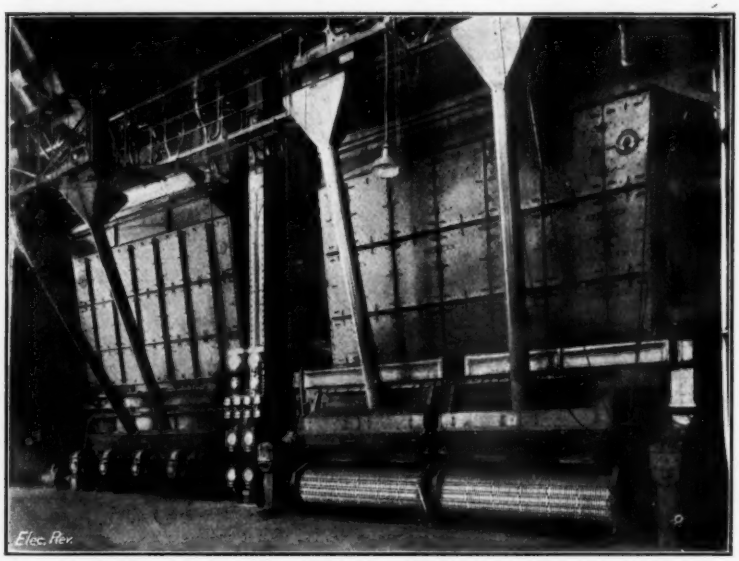


Fig. 1.—The Two New Boilers.

From time to time additions have been made to the generating plant, most of the earlier sets having been superseded; during the war a.c. transmission at 6,600 V three-phase was adopted, and two 5,000-kW turbo-alternators were installed, with rotary convertors to deal with the d.c. supply. In 1915 arrangements were made for linking up with the Fulham and Hammersmith Councils' undertakings, which has since been done. New consumers in a section of the area are supplied with a.c. through static transformer sub-stations, but where d.c. supply must be continued, rotary and motor convertors are employed, one convertor sub-station being entirely automatic.

The present extensions add 10,000 kW to the plant, and as Battersea is a "selected station," under the Central Electricity Board's scheme for South-East England, further plant of 30,000 kW capacity will be added during the next two years; by removing the old generating sets space can be made available to accommodate 100,000 kW in the existing engine room, and the site affords ample space for extending the boiler house, &c. The whole of the building and other constructional work has been carried out by the Council with "direct labour."

Two new boilers, with superheaters, economisers, air heaters, stokers, and chimney and draught plant, have been supplied by Messrs. Babcock & Wilcox, Ltd.; the boilers are of the cross-type marine design, steel cased (fig. 1). Each boiler has a heating surface of 10,202 sq. ft., and will evaporate from 65,000 to 95,000 lb. of water per hour at a working pressure of 325 lb. per sq. in. The superheaters are of the integral type, giving a final temperature of 700 deg. F. One boiler is fitted with a compartment-type stoker, the other with an Erith-Roe stoker, having 12 retorts. The stoker arches are of the Liptak flat suspension type. Each boiler unit is fitted with a steel chimney of 7 ft. diameter, mounted on a

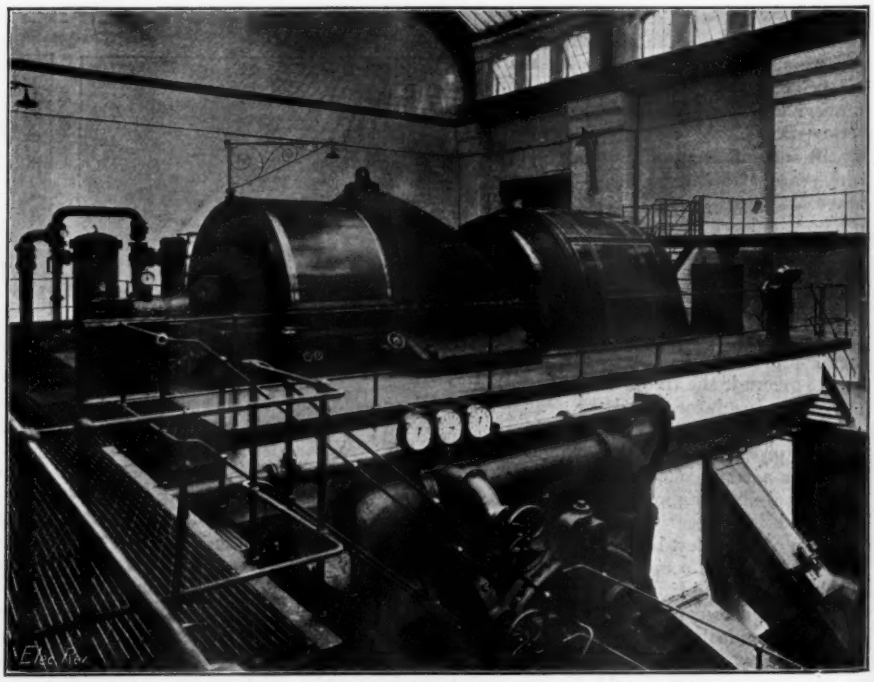


Fig. 2.—The 10,000-kW Turbo-alternator, Condenser, and Air Ducts.

dust collector of the Davidson type. The coal and ash handling plant was also manufactured by Messrs. Babcock & Wilcox. The former consists of a gravity bucket conveyor with a capacity of 40 tons of coal per hour.

The coal is discharged from the bunkers into 2-cwt. automatic weighing machines, supplied by Messrs. W. and T. Avery, Ltd. The ashes are discharged from the back of the stokers through chutes into pans on the floor (fig. 3); the lower ends of the chutes are immersed in water, forming a seal, and the quenched ashes are raised

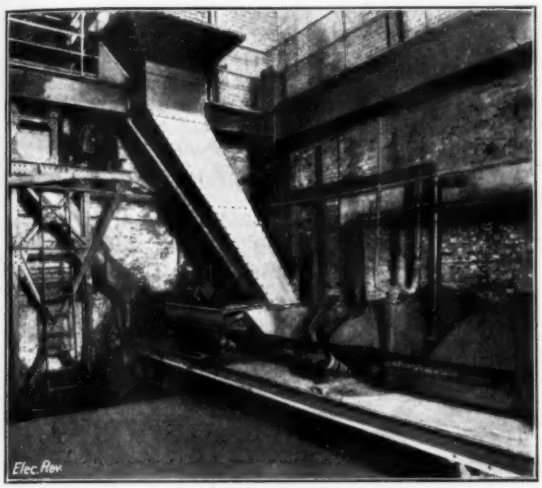


Fig. 3.—Ash Chute and Conveyor.

by means of paddles, operated by a wire rope, on to belt conveyors. The belts used are of the British Goodrich Rubber Co.'s manufacture. With this system of ash handling there is a complete absence of dust and fumes.

The new turbine, fig. 2, is of the Fraser & Chalmers high-pressure impulse multi-stage type, designed for a normal load of 10,000 kW, but capable of a maximum load of 12,500 kW, and runs at 3,000 r.p.m. with steam at 300 lb. per sq. in., 750 deg. total temperature. The design is based on the latest research in the utilisation of high-pressure steam. Hitherto it has been the practice to expand the steam in the first stage down to a comparatively low pressure, as the problem of keeping the casings and packing glands steam-tight, and the

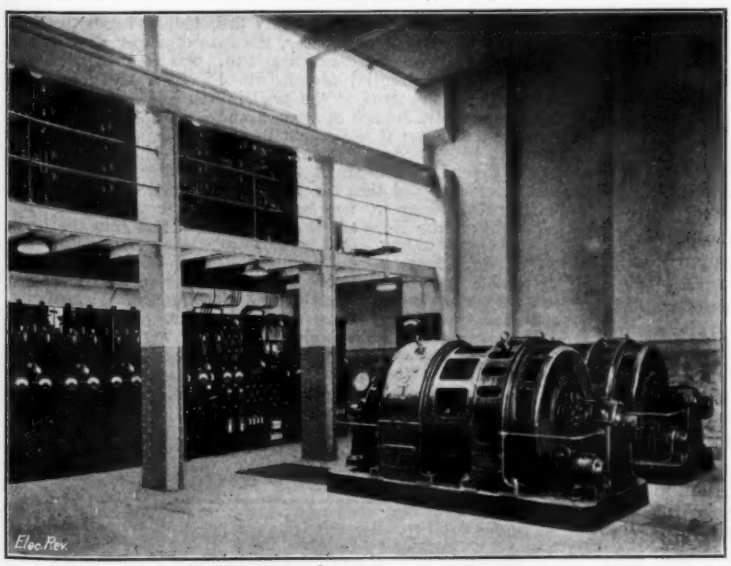


Fig. 4.—Interior of Automatic Sub-station.

casing free from dangerously high temperatures, has necessitated this course; Messrs. Fraser & Chalmers have replaced the first stage by a number of stages of comparatively small diameter, each stage utilising a small heat drop only, so that the efficiency of this portion of the turbine is the highest that can be obtained.

The turbine rotor blades in the high-pressure part are attached to a sleeve, which is provided with grooves, the blades being securely inserted in it by means of

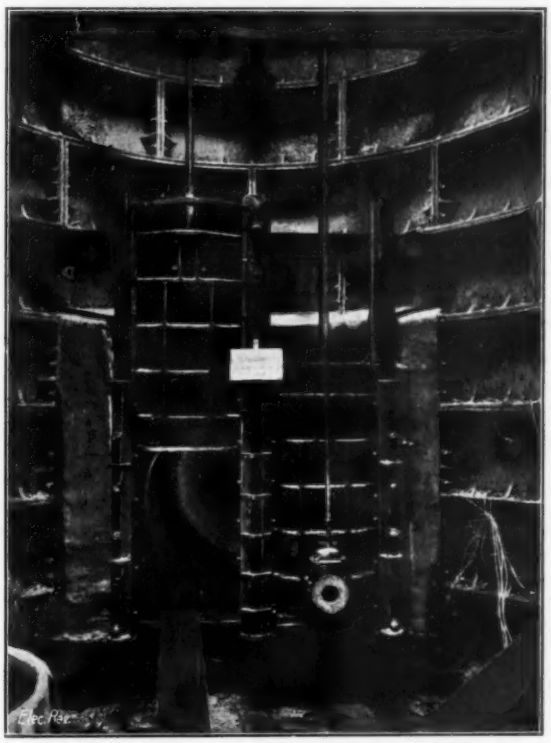


Fig. 5.—Penstock at Shore end of Tunnel.

specially designed roots. The sleeve is mounted on the shaft with a small clearance, so that the shaft is protected against the high temperature of the sleeve. In the low-pressure portion wheels carry the moving blades. The alternator was built at the G.E.C. Engineering Works at Witton, for a normal rating of 12,500 kVA, and an overload of 25 per cent. for two hours. The stator frame weighs 40 tons; the rotor was produced from a single steel forging of 10 tons weight.

A totally-enclosed system of ventilation has been adopted, the air being circulated in a closed circuit by a separate motor-driven fan. This closed circuit consists of the alternator, a surface cooler, and short connecting ducts contained within the foundation blocks. The heat generated in the machine is abstracted from the air by means of a surface cooler, the cooling medium being the condensate and make-up feed water; thus the bulk of the heat is passed back to the boilers. Should the air become unduly hot, doors are automatically opened to the atmosphere—but in the event of a short-circuit occurring in the alternator, the doors are kept closed by the instant action of a relay, so as to minimise the liability of fire in the machine. This system of ventilation is known as the "Battersea system," having been originated by the engineers of the Battersea electricity works; the cooling apparatus was supplied by the Premier Cooler and Engineering Co., Ltd.

For controlling the new 10,000-kW alternator, and for linking-up to the existing busbars, switchgear supplied by the Metropolitan-Vickers Electrical Co., Ltd., has been installed, consisting of two metal-clad compound-filled oil circuit-breaker sets.

having duplicate busbars, together with a control board, an automatic field-breaking switch pillar, and neutral earthing equipment. The components of this installation are insulated for 11,000 volts, and each set has a rupturing capacity of 500,000 kVA.

The surface condensing plant was manufactured by Messrs. Hick, Hargreaves & Co., Ltd., being designed to condense 119,000 lb. of exhaust steam per hour. The amount of circulating water required is 798,000 gallons per hour, and the cooling surface of the condenser is 14,500 sq. ft. The air and other gases are withdrawn from the condenser by a "Hick-Breguet" Ejectair.

The condensate passes through the ejector heater, and thence to low-pressure and high-pressure feed heaters, which are supplied with steam tapped from two branches on the main turbine at absolute pressures of 4.9 and 29.8 lb. per square inch respectively. The final temperature of the feed at discharge to hot well is 190 deg. F. From the hot well the condensate passes through a physical deaërating plant, and thence to the boiler feed pump.

A fifty-ton overhead electric travelling crane, by Messrs. Herbert Morris, Ltd., has been installed.

The extensions to the generating station necessitated increasing the capacity of the circulating water system, and it was decided to arrange for a new intake from the river, the intake being situated at a distance of 300 ft. from the river wall to enable water to be obtained at all states of the tide. A tunnel (fig. 5), of 5 ft. internal diameter, was driven to connect the intake chamber with a screen chamber, which is also connected to a suction chamber on the bank of the river. The screen chamber is 15 ft. in external diameter and 36 ft. 6 in. deep. In this chamber there are installed two band-type screens of Messrs. F. W. Brackett & Company's manufacture, each capable of passing 1½ million gallons of water per hour under minimum immersion conditions.

The existing pump-house has been modified to allow of the installation of a pump of Messrs. Worthington Simpson's make, having a capacity of one million galls. per hour, driven by an electric motor. Provision is made for installing at a future date three further pumps of similar duty.

The construction of the tunnel, together with suction and screen pits and pipework to the engine room, has been carried out by the Foundation Company, Limited.

The Lavender Hill sub-station is equipped with automatically controlled motor convertors. The sub-station is laid out to accommodate four 750-kW convertors, but at present only two have been installed. Both machines, with the necessary control apparatus, were manufactured and installed by the General Electric Co., Ltd. A general view of the sub-station is given in fig. 4.

The incoming supply is from two 6,600-V feeders, and there are six outgoing feeders supplying a 460-V network. The high-pressure switchgear is of the steel plate cubicle type, and it is situated on a gallery. Inverse-time-limit overload and reverse power protection is provided. The direct current switchboard is situated under the gallery. Six of the panels control the outgoing feeders, while on the remainder of the panels are mounted the control relays and protective apparatus for the direct-current side of the motor convertors.

The control of the outgoing feeders is effected by means of auto-release circuit-breakers; this ensures that should an overload occur on one of the feeders it will be automatically put back into service unless the network is short-circuited. Should there have been a complete shut-down on the system, all the machines in a station are started simultaneously and connected to the bars. In this way the maximum power is made available to deal with any load that may be connected to the system. This provision is necessary since, after a general shut-down, an automatic station will be first on to the system, and for a time may have to deal with loads much in excess of normal.

The splendid showrooms in Lavender Hill, known as "Electric House," are noteworthy from the artistic and architectural points of view, quite apart from their utilitarian aspect. A full description was published in our issue of Nov. 11th, 1927, when "Electric House" was opened. It is a six-storey building, with a frontage of 65 ft., the elevation rising to 54 ft. The front is floodlighted at night. Part of the basement is devoted to a display of fittings, shades, standards, fires and domestic appliances, &c.; the ground floor has a large entrance hall running back the full depth of the building, *viz.*, about 60 ft.; this hall is beautifully decorated. On one side of the hall, and opening out of it by wide entrances, are a bathroom, bedroom, and drawing-room, while on the other are to be found the kitchen, dining-room, and oak hall. These rooms show the latest modern developments of electricity for lighting, heating, and other purposes in the home. There is also a scientific illumination room. On the first floor is a demonstration hall, also the borough electrical engineer's office, with waiting-room and typists' room adjoining.

The domestic rates for supply are low, and attractive free-wiring, hire, and hire-purchase schemes are offered to residents.

The extensions above described have been carried out by the borough electrical engineer, Mr. F. A. Bond, with the assistance of his deputy, Mr. H. F. J. Thompson, and his late assistant, Mr. F. Favell. The borough surveyor, Mr. T. W. A. Hayward, and his staff were responsible for the architectural and constructional work in connection with the buildings.

Legal.

Marconi's Wireless Telegraph Co., Ltd., v. Birmingham and Coventry Cycle Co.

A MOTION by Marconi's Wireless Telegraph Co., Ltd., against the Birmingham and Coventry Cycle Co. for an injunction restraining the infringement of four patents relating to a wireless receiving set known as the "Mullard Master Three," came before Mr. Justice Romer in the Chancery Division on July 6th.

Mr. SHELLEY, for the defence, said he was willing to submit to an injunction, though he had a perfectly good defence. This was that the salesman who made the infringing sale was acting without authority and outside the scope of his duties, and therefore the defendants were not liable. But for the sake of peace he was submitting to judgment.

His LORDSHIP said that by consent there would be an injunction, an inquiry as to damages, delivery up, and costs.

Piper v. Metropolitan Electric Tramways, Ltd.

IN the Court of Appeal, on July 3rd, before Lords Justices Scrutton, Lawrence and Greer, the case of Piper against the Metropolitan Electric Tramways, Ltd., was concluded on the appeal of the plaintiff, Mr. Edwin Piper, from the verdict and judgment entered at the trial in the King's Bench Division before Mr. Justice Shearman and a special jury.

Mr. Piper brought the action to recover damages for injury done to his "Foden" steam wagon by a collision with one of the defendant company's tramway cars during the general strike. He alleged that the tramway car, driven by a young emergency volunteer, was negligently driven at a fast rate downhill on the Edgware Road at Hendon and into the back of the steam wagon.

The defendants denied negligence, and alleged that the driver of the steam wagon, after obstructing the tramcar, ran into the side of it and caused the damage. Defendants counter-claimed for damage to the tramcar.

The jury found that both the drivers were substantially guilty of negligence, and that neither was guilty of negligent driving alone. Upon these findings the Judge gave judgment for the defendants on the claim and for Mr. Piper on the counter-claim.

Without calling upon counsel for the respondents their Lordships dismissed the appeal with costs.

Cleaning Aluminium.

Grease and oil are commonly removed from the aluminium parts of motor vehicles, &c., with paraffin. If it is desired to neutralise the latter with the aid of caustic soda, which attacks aluminium, this can be done with safety, according to the British Aluminium Co., Ltd., by adding to the solution a small proportion of water-glass, which prevents action on the metal.

Business and Industrial Notes.

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations and Failures.

The Conference on Industrial Relations: Interim Report.

We have received a copy of the Interim Joint Report which was submitted to the full Joint Conference on July 4th by the Joint Committee of the Conference and was adopted. This interim report was issued because it was realised that a considerable time must elapse before the whole of the agenda agreed upon by the Conference could be completed. The report refers to the origin of the movement, the vast area to be covered in trying to solve the greatest problem confronting the country at the present time, and the special topics to be discussed and investigated. Committees discussed at length proposals for new conciliatory machinery and a scheme for setting up new machinery for endeavouring to avoid disputes was adopted in committee on June 21st. It is understood that the Employers' Section of the Joint Conference will take the necessary steps to bring the recommendations of the full Joint Conference to the consideration of the appropriate employers' organisations, and that the General Council section of the Joint Conference will take the necessary steps to place the recommendations of the Full Joint Conference before the Trade Union Congress in September. The Conference on Industrial Re-organisation and Industrial Relations and the Joint Committee of the Conference will continue their deliberations until the items on the agenda have been exhausted, irrespective of the creation of the National Industrial Council. The report contains particulars of the statements and resolutions already adopted regarding trade union recognition, victimisation, the proposed immediate formation of a National Industrial Council, its composition and main functions, the prevention of disputes, rationalisation, and the gold reserve.

The recommendations regarding the National Industrial Council read as follows:—

(1) A Standing Committee of the National Industrial Council, nominated as to half its members by the General Council representatives of the National Industrial Council and as to half by the National Confederation of Employers' Associations' representatives of the National Industrial Council, should be set up to act as the elective and executive authority for the provision of Joint Conciliation Boards for industrial disputes.

(2) The Joint Standing Committee should lay down the detailed nature of the Joint Conciliation Boards, their procedure and functions, but in doing this they should be guided by the following considerations:—

(a) When a dispute has failed to be settled within an industry, on the application of either party the Joint Standing Committee would make available a Joint Conciliation Board to investigate and report upon the matters tending towards a dispute. In order to facilitate investigation it is desirable that both parties should arrange that on an application made to the Joint Standing Committee no stoppage of work or alteration in conditions should take place pending the report of the Joint Conciliation Board.

(b) The Report of the Joint Conciliation Board should be reported to the parties and to the Joint Standing Committee before publication.

(c) The personnel of the Joint Conciliation Boards should not be permanent. The Joint Standing Committee should appoint in each particular case referred to a Joint Conciliation Board the most suitable representatives to deal with the particular industry or matter tending towards dispute.

(d) The Joint Standing Committee should have authority to reject application for reference to the Joint Conciliation Board, if, in their opinion, the dispute was not of such a nature as should be referred.

(e) The Joint Standing Committee should also fix a time limit for the stages of reference, hearing and report to a Joint Conciliation Board so that the matters in dispute should be reviewed promptly and reported upon without undue delay.

Mr. Ben Turner, who presided (supported by Lord Melchett), expressed the hope that if the Conferences were endorsed by the Trade Union Congress in September, they would go on to discuss the problem of unemployment at an early date, as that was the constant menace overshadowing the lives of the workers. He hoped also that the report would give a basis for a national understanding and national development.

Electrical Review Index.

The index to Vol. CII (for the half-year ended June 30th, 1928) will be published shortly, and we shall be glad to receive the names and addresses of those who require it (free of charge) for binding purposes or wish to retain it for reference. Application should be made as early as possible to the Publisher, 4, Ludgate Hill, E.C.4.

Manchester Cable Contracts.

The Manchester City Council, on July 4th, placed orders for electric cables amounting to £139,000. The work was divided up among eighteen firms, all of which were British, with one exception, namely, a Berlin firm. In this case, which related to six per cent. of the total order, a contract (about £8,000) was given because cable was being offered at about half the price of the British tenders for similar cable. An amendment referring the matter back in order that it might be definitely ascertained that the wages paid by, and the conditions of employment under, the German firm compared favourably with English wages and conditions, was defeated. The mover, a Labour member, said that they were out now to fight the German capitalist, who was attacking the British capitalist, but if they gave the order to Berlin they would be assisting the German capitalist to beat the English capitalist. They should not send the contract to Berlin unless the wages paid there were comparable with those paid here. Alderman Walker said that if it had been carried it would have been a declaration on the part of the Council that they were going to admit no competition from abroad.

Porcelain for the Central Board's Lines.

According to the *Manchester Guardian*, Sir Francis Joseph, president of the North Staffordshire Chamber of Commerce, has written to the Central Electricity Board, stating that in connection with one of the big national electricity schemes recently half the electrical porcelain required was bought from abroad. He urged that in dealing with the materials required for the work in connection with the South-East England scheme the Board should make it a condition of its contracts that only British-made plant and machinery should be used, particularly as the rate of unemployment in the British pottery industry was one of the highest in the country.

The Board has replied that all the contracts placed so far have gone to British firms. Half of the porcelain referred to by Sir Francis has been ordered in this country, while the other half is being obtained from Canada.

The Radio Wholesalers' Federation.

In our issue of May 18th (p. 863) we reported the formation of a Radio Wholesalers' Federation, and some details of the new organisation were given. We have now received a copy of the objects and regulations of the Federation from the secretary, Mr. J. Macfarlane, 35, Sicilian House, Sicilian Avenue, W.C.1, together with a form of application for membership, setting out the conditions. The applicant undertakes to maintain discounts and conditions of sale, and to keep any retail business completely separate from his wholesale business; and there is a limit to the quantity of goods which a wholesaler may supply to his retail business (if any).

A German Electrical Development Competition.

With the object of arousing greater interest in household electrical appliances, the Development Association to which all the electricity supply undertakings in Berlin are affiliated recently organised a competition by means of voting papers as to the most popular forms of appliances. A list of twenty different forms of apparatus was drawn up, the public being asked to number them in accordance with their own ideas as to the relative degree of usefulness and popularity. The results, which have recently been announced, show that electric suction cleaners and electric irons easily headed the list with 115,227 and 113,095 votes respectively. Third in the list with 33,708 votes were electrically-heated cushions, followed by hot plates, cookers, heaters, washing machines, &c.

Hire Purchase at Guilaford.

A hire-purchase scheme for the wiring of premises and the sale of appliances has been adopted on the basis of a 20 per cent. payment down by approved owner-occupiers and landlords, and a 30 per cent. payment down by tenants, with the balance spread over three, four or five years.

The G.E.C. in South Africa.

The British General Electric Co., Ltd., has just opened new showrooms at the South African headquarters of the company in Johannesburg. The headquarters, "Magnet House," comprises a four-storey building of imposing proportions, and forms one of the architectural features of the city. The ground floor, second and third floors, are used as stockrooms, the first floor being set aside for offices and showrooms. The reconstruction of the latter on Tudor lines has created considerable interest among the trade and the public, particularly as showrooms of such a nature are unique in South Africa.

"Magnet House," Johannesburg.

The showrooms are designed to display electric light fittings and fixtures, and domestic appliances, and in connection with the last named a completely equipped domestic kitchen has been built at the end of the main showrooms. Already there is definite evidence that the activities of the G.E.C. in the Union have given a stimulus to many varied industrial interests, and the establishment of the showrooms should undoubtedly have the effect of promoting the wider adoption of electricity. "Magnet House," Johannesburg, is depicted herewith.

Social Events.

The annual outing of the staff of Messrs. John Shaw and Sons, Wolverhampton, Ltd., took place on June 16th. The venue this year was Matlock, and a party of about 70 travelled thence by saloon motor coaches. A break was made at Buxton for luncheon, after which Mr. W. B. Hickman, joint secretary, proposed the toast of the firm, and welcomed the new general manager, Mr. V. A. Mattick, and Mr. T. W. Simpson, a director. The general manager expressed pleasure at being present, and hoped that the social side would be extended by having dances, &c., in the winter. Mr. T. W. Simpson expressed regret at the death of Mr. A. Blower, who had to his credit an unbroken record of service of over 72 years. Mr. W. Neal (manager of the home department) supported the toast. Upon arrival at Matlock each member of the party followed his own inclinations.

Perfect summer weather favoured the ninth annual athletic sports of the General Electric Co., Ltd., which were held at the company's sports ground, Preston Road, Wembley, on July 7th. The day's programme was an extensive one, and included 47 events, which were witnessed by a large gathering of employés and friends. An interesting innovation was the installation of four G.E.C. amplifiers, which considerably aided the stewards in getting together the competitors for the various events. The competition for the large number of valuable prizes was very keen, and aroused great enthusiasm. In the unavoidable absence of Lady Hirst, the prizes were distributed by Mrs. Leslie Gamage, and an extremely enjoyable day was brought to a conclusion with an alfresco concert, and dancing on the green, the music for the latter being played by the band of the 23rd London Regiment, which rendered an excellent programme of music during the afternoon.

The "Metrovick" athletic sports on June 30th were interrupted by frequent showers. The condition of the ground was such that no record times could be expected, but the competitors stuck to it very gamely in spite of numerous falls. A comic touch was given to the proceedings by the introduction of a Rugby football match with players in fancy costume. The prizes were presented by Mrs. Tom Beech, the wife of the chairman of the Foremen's Association. This year the company presented a silver challenge cup to be held for one year by the department scoring the highest number of points in the various events after adjustment according to the size of the department. The Motor Department was the first winner, with 16½ points, against the Meter Department's 16.

The eighteenth annual outing of the employés and staff of the South Metropolitan Electric Light & Power Co., Ltd., was held at Margate on June 23rd, 1928, about 120 sitting down to dinner served at the Fort Paragon Hotel, Cliftonville. The weather was excellent, and the party had a thoroughly enjoyable day.

The twenty-fourth annual outing of the employés and staff of the South London Electric Supply Corporation, Ltd., was held at Margate on June 30th. Good weather favoured the outing, and an excellent lunch, provided at the Grand Hotel, Cliftonville, was thoroughly enjoyed by the 125 members. The lady members of the staff arranged for a separate outing consisting of a dinner at the Florence Restaurant, W., followed by a visit to a theatre. The innovation proved in every way successful.

The warehouse and head office staff of Messrs. Falk, Stadelmann & Co., Ltd., held an outing on June 30th, proceeding to Margate. The party, numbering just over 400, left Holborn Viaduct by special train, and lunch was served at Dreamland Park. The lunch was presided over by the chairman of the company, Mr. Max Falk. The outing was in every way a great success.

Conditions in China.

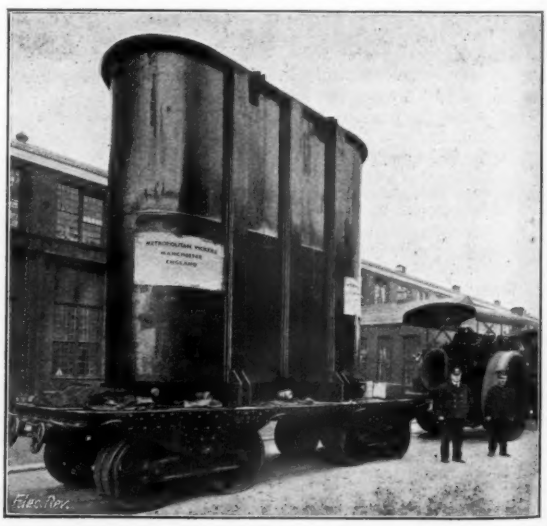
In the course of a recent report, the Acting British Commercial Counsellor at Shanghai states that in Hong Kong the firms interested in the importation of machinery have been doing a fairly satisfactory business, chiefly in electrical equipment, building materials, &c. On the mainland conditions are still too unsettled to admit of any important industrial developments, and such demand as exists is mainly for small internal combustion engines of one to five horse-power used for rice-hulling plants and various other purposes. Two important projects at present under consideration at Canton are the installation of an automatic telephone system, and the establishment of a broadcasting station, but considerable difficulty will certainly be experienced in financing these schemes. It is stated that the contract for the former has been offered to a Chinese-American corporation. The cost is estimated at 700,000 dollars, and the terms of payment, which provide for an initial payment of ten per cent. and the balance in instalments, is an arrangement hardly likely to prove acceptable to any British firm.

Unemployment.

There was a further increase of 30,080 in the number of unemployed during the week ended June 25th. The total at that date was 1,192,600, as compared with 1,162,520 on June 18th, and with 1,004,613 on June 27th, 1927.

Large Metro-Vick Transformers.

The accompanying illustration shows what is claimed to be the largest British three-phase transformer yet constructed leaving the Metropolitan-Vickers works on a 100-ton road lorry for the Barton power station of the Manchester Corporation. It is one of two units of this size which are being installed as main step-up transformers for service with a new 40,000-kW Metropolitan-Vickers turbo-alternator set. The transformers are rated at 25,000 kVA (B.E.S.A. rating), 6,600/33,000 V, three-phase, 50 cycles. They are of the core-type three-legged



A Large Metro-Vick Transformer for Barton.

design, arranged for forced cooling with external oil coolers. The tanks are fitted with conservators, pressure-relief valves and remote-indicating temperature indicators. Each unit measures 15 ft. long, 7 ft. wide, 15 ft. in height to the top of the tank, and 16 ft. 6 in. to the top of the oil conservator. The previous largest three-phase transformers of British manufacture were the six 19,500-kVA Metropolitan-Vickers units installed some four years ago as the original main step-up transformers of the Barton power station.

Henley's in Shanghai.

Messrs. W. T. Henley's Telegraph Works Co., Ltd., have sent us some very interesting photographs which they have received from their Shanghai house. One of these is reproduced herewith. It shows a gang of coolies pulling in a

Laying Henley Cable in Shanghai.

length of 0.2 sq. in. 22,000-V H.S.L. type cable for the Shanghai Municipal Electricity Department. Apart from the setting the method of dealing with this cable is of interest.

New Catalogues and Lists.

NORMAND ELECTRICAL CO., LTD., 3, North Side, Clapham Common, S.W.4.—Price list of "Neco" motors, including repulsion and induction motors, motor-generators, grinding and polishing motors.

BROOK MOTORS, LTD., Empress Works, Huddersfield.—Particulars and prices of a number of machine tools that are for disposal.

ST. HELENS CABLE & RUBBER CO., LTD., Slough.—Leaflet describing their C.T.S. connector boxes.

MESSRS. JOSEPH KAYE & SONS, LTD., Lock Works, Leeds.—30-page catalogue illustrating and pricing numerous types of oil cans and feeders, petrol funnels, oil cabinets, &c.

ELECTROHEATERS COMPANY, 17, Old Queen Street, London, S.W.1.—Illustrated circular, giving particulars and prices of their tubular system of electric heating.

METROPOLITAN-VICKERS AUSTRALIA PTY., LTD., Auburn, N.S.W.—Two illustrated leaflets dealing respectively with h.p. air-break switches and current transformers.

SWEDISH GENERAL ELECTRIC, LTD., 5, Chancery Lane, W.C.2.—An illustrated booklet containing very full particulars of "A.S.E.A." relay protective gear for generating and transformer stations.

THE BRITISH ALUMINIUM CO., LTD., Adelaide House, King William Street, E.C.4.—An illustrated booklet dealing with the use of aluminium in the construction of omnibuses and coaches.

BRITISH INSULATED CABLES, LTD., Prescot, Lancs.—List No. P.236, a general descriptive catalogue of wiring materials, &c., for electrical contractors; and List No. P.238, containing illustrated particulars of "Prescot" terminal boxes and sealing ends.

THE FULLER ACCUMULATOR CO. (1926), LTD., Woodland Works, Chadwell Heath, Essex.—List No. 102 P., containing particulars and prices of "Sparta" automobile and 'bus lighting batteries in moulded containers.

WANDSWORTH ELECTRICAL MFG. CO., LTD., Imperial Works, Kenyon Street, Birmingham.—28-page pocket price list of their numerous switches, switch-plugs, wall plugs and sockets, and other electrical accessories.

AUTOMATIC TELEPHONE MANUFACTURING CO., LTD., Milton Road, Edge Lane, Liverpool.—12-page descriptive list (No. 82), particularising their "Universal" duplex unit, a convenient combination of telegraph apparatus, and giving suggestions for its application.

GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2.—Priced leaflet giving information concerning the new "Gyro" pattern and other "Magnet" electric fans.

SIEMENS ELECTRIC LAMPS & SUPPLIES, LTD., 38-39, Upper Thames Street, London, E.C.4.—Catalogue No. 198, consisting of several sections relating to "Holophane" reflectors for use with various classes of illumination units.

MESSRS. H. CLARKE & CO. (MANCHESTER), LTD., Atlas Works, Old Trafford, Manchester.—Price List No. 33, of insulating materials and manufactures, including mica, bakelite, tapes and cloth.

MESSRS. JOHN MOORES & CO., Ravald Street Works, Salford.—A price list of tapes, sleeving, ebonite, compound and other insulating materials.

ATELIERS DE CONSTRUCTIONS ELECTRIQUES DE CHARLEROI, 56, Victoria Street, S.W.1.—July stock list of motors and dynamos.

MESSRS. MERRYWEATHER & SONS, LTD., Greenwich Road, S.E.10.—An illustrated folder advertising fireproof asbestos blankets for kinemas, &c.

Bankruptcy Proceedings.

P. W. ARNOLD, Henlow, Beds., electrical engineer.—The public examination of this debtor took place on June 26th, at the Shire Hall, Bedford, when the matter was adjourned for closing. According to the statement of affairs returned by the debtor there were liabilities of £1,373, all due to unsecured creditors, against assets of £243, leaving a deficiency of £1,130. Debtor stated that he had purchased for £350 the business of a motor and cycle engineer at Henlow, Beds. He had had no capital, but borrowed £375 from relations, with which he paid the purchase price. Debtor traded for five years with some success, but was unable to repay the loan borrowed. He paid £25 to his sister as interest. He had borrowed about £540 since 1926.

A. B. GREGORY, 29, St. Albans Road, Seven Kings, Essex, wireless expert.—The first meeting of creditors was held on July 5th, when the matter was left in the hands of the Official Receiver as trustee. The receiving order was made recently on a creditor's petition. The liabilities amounted to £428, against assets of £4, leaving a deficiency of £424.

J. D. RIDLEY (Eastern Counties Electrical Construction Co.), electrical engineer, 41, Butter Market, Ipswich.—Receiving order made June 26th, on a creditor's petition.

W. T. LACEY, electrical engineer and contractor, 10, George Street, Bath.—First meeting held July 11th at the Official Receiver's offices, 26, Baldwin Street, Bristol. Public examination, July 23rd, at the County Court Offices, Bath.

L. BELL (C. Bell), mechanical and electrical engineer, Joseph Street, Bradford.—Trustee, Mr. J. Lund, City Chambers, 2, Darley Street, Bradford, released June 19th.

G. DODD, wireless dealer, &c., The Arches and Radcliffe Road, Crimble, Golcar.—Last day for proofs for dividend, July 17th. Trustee, Mr. J. O. Morris, Official Receiver, 12, Duke Street, Bradford.

C. S. HILL (Sanderson Hill & Co.), electrical factor, Waltham Chambers, Waltham Street, Kingston-upon-Hull.—First meeting July 17th, at the Official Receiver's Office, 37, Scale Lane, Hull. Public examination July 23rd, at the Guildhall, Hull.

W. A. BARKER and F. G. H. BARKER (Barker Bros.), electrical engineers, 554a, Dudley Road, Wolverhampton.—Trustee, Mr. S. W. Page, Official Receiver, 30, Lichfield Street, Wolverhampton, released June 27th.

J. H. GORDON, electrical engineer, 21, Leeds Road, Ilkley.—Last day for proofs for dividend, July 25th. Trustee, Mr. H. C. Bowling, Official Receiver, 24, Lower Bond Street, Leeds.

Company Liquidations.

N.K. (BRADFORD), LTD.—Winding-up order made by the High Court on July 2nd.

HANDCROSS ELECTRICITY CO., LTD.—A meeting of creditors was held on July 9th at the offices of Messrs. A. Simmons and Co., The Market Hall, Redhill. Particulars of claims by July 9th, to the liquidator, Mr. A. R. Thompson.

Campbell Gas Engine Co., Ltd.

Mr. G. P. Norton, Huddersfield, has been appointed receiver by the Court. He says that efforts to reconstruct the company have failed, and the assets will now be realised under the Court. It is hoped that it will be possible to sell the business as a whole, but it is clear that the assets will not realise sufficient to pay the debenture holders in full; therefore there cannot be anything for the creditors.

Trade Announcements.

The WYCOMBE (BOROUGH) ELECTRIC LIGHT & POWER CO., LTD., has removed its offices to 2, Frogmoor, High Wycombe, where a showroom for fittings and appliances has been opened.

REMAX, LTD., 5-6, Eden Street, Hampstead Road, N.W.1, of which company Mr. A. S. Gregg is managing director, is now acting as sole representative and distributor in London and district for Messrs. Ward & Goldstone, Ltd., with whom the company is associated.

MESSRS. HART BROS. ELECTRICAL MANUFACTURING CO., LTD., Ponders End, have opened a London store and warehouse at 8-9, Gray's Inn Passage, Red Lion Street, W.C.1.

The address of the BRITISH GENERAL ELECTRIC CO., LTD., Wellington, New Zealand, will in future be 31-37, Taranaki Street, Wellington.

Dissolutions of Partnership.

HANCHETT, BARRATT & CURRIE, electrical contractors, Lower Gold Street, Pendleton, Salford.—Messrs. G. Hanchett, C. H. Barratt and G. Currie have dissolved partnership. Messrs. Hanchett and Currie will attend to debts and continue the business under the style of Currie & Hanchett, at Number 5 Street, Manchester.

G. HANCHETT, BARRATT & CO., electrical engineers and makers of electrical machinery, Lower Gold Street, Pendleton, Salford.—Mr. G. Hanchett and Mr. C. H. Barratt have dissolved partnership. Mr. Barratt will attend to debts, and will continue the business at Lower Gold Street, Pendleton, under the style of Chas. H. Barratt, Successor to G. Hanchett, Barratt & Co.

A. & F. GARNETT & CO., electrical engineers, 29, New Kent Road, S.E.—Messrs. A. J. Garnett and A. E. Joiner have dissolved partnership. Mr. Garnett will attend to debts.

Book Notices.

"Practice and Progress in Combustion of Coal as Applied to Steam Generation."—We have received from International Combustion, Ltd., a copy of the paper read by Mr. F. H. Rosencrants before the Institution of Electrical Engineers in May last, which was abstracted in our issues of May 11th and 18th. Included are some excellent views of pulverising plant at Derby and Poplar power stations, &c.

"Nickel and its Alloys" is the general title of a collection of papers in a loose-leaf binder published by the Mond Nickel Co., Ltd., Victoria Station House, S.W.1. These papers contain the results of work carried out by the company's Research and Development Department, which collaborates with anybody interested in the manufacture, fabrication or utilisation of nickel and its alloys, and places information freely at the disposal of the industry.

Reductions of Capital.

REES ROTURBO MANUFACTURING CO., LTD., and reduced.—A petition has been presented to the High Court for the confirmation of the reduction of the capital of the company from £250,000 to £112,561, and will be heard in London on July 24th.

PEACEHAVEN ELECTRIC LIGHT & POWER CO., LTD., and reduced.—A petition has been presented to the High Court for the confirmation of the reduction of the capital of the company from £20,000 to £11,174, and will be heard in London on July 16th.

A Report upon Rumania.

Mr. R. J. E. Humphreys, British Commercial Secretary at Bucharest, has reported to the Department of Overseas Trade on economic conditions in Rumania (Stationery Office, 2s. net). In the course of his report, Mr. Humphreys says that broadcasting rights have been conceded to a Rumanian company which is to construct two stations. Since the company began to operate, the importation of radio apparatus and parts has increased, and may be expected to increase still further. Rumania is a market which should not be neglected by British manufacturers of such apparatus. A programme of telephone and telegraph work to cost about £12,000,000 has been prepared; this includes the laying of cables from Bucharest to the western frontier through Ploesti and Brasov with branches to some of the larger towns. An automatic telephone system has been installed in part of the Bucharest area, and it is desired to completely convert the capital's system and to extend automatic working to other of the more important towns. An appendix to the report shows that in the first six months of 1927 Rumania imported electrical machinery from the following countries:—United Kingdom (63,312 kg.), Austria (132,384 kg.), Belgium (18,363 kg.), Switzerland (43,139 kg.), France (74,777 kg.), Germany (342,934 kg.), Italy (3,559 kg.), and Holland (14,677 kg.). Mr. Humphreys considers that British manufacturers would be advised to begin to introduce their goods in anticipation of the improved foreign trade which will follow the economical consolidation of the country. A certain amount of caution is necessary, and careful inquiries should be made, when credit is granted, as to the reputation and financial standing of prospective customers. It is not advisable to give open credits, but only against acceptances. Reliable agents are essential, and in this direction the Commercial Secretary offers his assistance to British firms.

For Sale.

Guildford Sanitary Committee invites offers for an electric lighting set lying at the destructor works. Messrs. H. Butcher, Hall & Co. will sell by auction on July 25th, at Bishop's Stortford, electric motors, dynamos, generating sets, petrol engines, pumps, &c. Leyton Borough Council Electricity Department has for disposal surplus generating sets, &c. West Midlands Joint Electricity Authority invites offers for one 400-kW turbo-generator, one Parsons condenser, circulating and air pumps, &c. (See our advertisement pages to-day.)

United States Electrical Exports.

The total value of electrical machinery and equipment exported from the United States during April last was $8,606,909, as compared with $8,845,709 in the corresponding month of last year. The classes recording the greatest increases were:—Batteries, from $802,195 to $859,085; rectifiers, motor-generators, &c., from $75,253 to $171,467; switchboard panels, from $81,829 to $264,349; watt-hour and other meters, from $41,774 to $123,608; portable electric tools, from $58,503 to $120,848; carbon furnace electrodes, from $159,013 to $245,038; bare copper wire, from $139,406 to $220,052; and refrigeration sets, up to 1-ton capacity, from $252,073 to $593,220. The principal decreases were as follows:—D.c. generators under 500 kW, from $126,581 to $88,532; self-contained lighting outfits, from $111,148 to $65,890; switches and circuit breakers over 10 A, from $151,816 to $111,190; stationary motors from 1 to 200 h.p., from $400,683 to $219,144; railway motors, from $86,262 to $30,377; railway electric locomotives, from $259,771 to $40,505; electric fans, from $115,469 to $63,835; telephone apparatus, from $482,976 to $218,045; insulating material, from $152,190 to $77,957; unspecified apparatus, from $698,518 to $580,375; and insulated copper wire and cable, from $461,543 to $277,119. Canada, as usual, was the leading importer of American electrical goods, her share being valued at $2,427,200. Argentina, with $679,102, was second on the list, while the next in order were the United Kingdom ($543,251), Australia ($522,112), Mexico ($406,896), and Brazil ($399,322).

There was a slight increase in electrical imports into the United States, the total being $229,651; lamps were the leading item. The principal sources of supply were Sweden, Japan, and Germany.

Large Turbo Set for Berlin.

The BROWN BOVERI organisation has received an order for a single-shaft turbo-alternator set, having an output of 85,000 kW m.c.r. for the Zschornewitz power station, Berlin. The most economical output will be 75,000 kW and the speed 1,500 r.p.m. The generated pressure will be 13,000 V and the set will be designed for a power factor of 0.75. The steam turbine will be of the three-cylinder pattern, similar to the two installed at the Ferrybridge power station and those in hand for the Edinburgh Corporation. The order for this large set includes the complete condensing plant, which consists of two condensers and auxiliaries.

Bulgarian Duty Exemptions.

A recent law for the Encouragement of Local Industry has recently been passed by the Bulgarian Legislature. The *Board of Trade Journal* says that the new measure provides that all new machines and other parts, plant and materials not manufactured in Bulgaria which are imported for the installation and upkeep of industrial enterprises and for the production of electrical energy, and for the repair of their own plant in their own laboratories and workshops shall be exempt from Customs duty and municipal taxes. Motors which use foreign oil, however, will pay both Customs duty and municipal tax. This exemption from duty applies also to the case of industrial enterprises even though they do not satisfy some of the conditions prescribed in the present law, and to artisans' workshops without the necessity for the presentation of certificates issued by the Ministry of Commerce, Industry and Labour to the effect that the plant in question is not manufactured in Bulgaria.

Prices of Raw Materials.

The following prices are only general, and they may vary according to quantities and other circumstances:—

	CHEMICALS, &c.	Price July 10th.	Fortnight's inc. or dec.
a	Acid, Oxalic ... ... per lb.	5½d.	...
a	Ammoniac, Sal ... ... per ton.	£60	...
a	Ammonia, Muriate (large crystal) ,,	£52	...
a	Bisulphide of Carbon ... ... ,,	...	...
a	Borax ... ... ,,	£25	...
a	Copper Sulphate ... ... ,,	£25 10s.	...
a	Potash, Chlorate ... ... per lb.	3½d. to 4d.	...
a	,, Perchlorate ... ... ,,	5½d.	...
a	Shellac ... ... per cwt.	£15 10s.	...
a	Sulphur, Commercial ... ... ,,	£11	...
a	,, Roll ... ... ,,	£11	...
a	Soda, Chlorate ... ... per lb.	9d.	...
a	,, Crystals ... ... per ton.	£5 to £5 5s.	...
a	Sodium Bichromate, casks ... per lb.	8½d.	...
	METALS, &c.		
b	Aluminium, Ingots ... ... per ton.	£95 to £100	...
b	,, Wire ... ... per lb.	1/8 to 1/9	...
b	,, Sheet ... ... ,,	1/8 to 2/9	...
p	Babbitts Metal and Anti-friction Metal—		
	Grade I ... ... per ton net.	£193	...
	Grade II ... ... ,, ,,	£135	...
	Grade III ... ... ,, ,,	£73	...
c	Brass (rolled metal 2' to 12' basis) per lb.	9¾d.	...
c	,, Tubes (solid drawn) ... ... ,,	11¾d. to 1/-	...
c	,, Wire, basis ... ... ,,	9¾d.	...
c	Copper Tubes (solid drawn) ... ,,	1/0½	...
c	,, Bars (best selected) ... per ton.	£94	...
c	,, Sheet ... ... ,,	£94	...
c	,, Rod ... ... ,,	£94	...
d	,, (Electrolytic) Bars ... ,,	£69	...
d	,, ,, Sheets ... ,,	£143 10s.	...
d	,, ,, Wire Rods ... ,,	£79	...
d	,, ,, H.C. Wire per lb.	9¾d.	...
f	Ebonite Rod ... ... ,,	2/3 to 2/6	...
f	,, Sheet ... ... ,,	2/3 to 2/6	...
n	German Silver Wire ... ... ,,	2/2	...
h	Gutta-percha, fine ... ... ,,	6/3	...
h	India rubber, Para fine ... ... ,,	11½d.	½d. inc.
l	Iron Pig (Cleveland No. 3.) ... per ton.	68/-	...
l	,, Wire, galv. No. 8, P.O. qual. ,,	£21	...
g	Lead, English pig ... ... ,,	£21 15s.	5/- dec.
g	Mercury ... ... per bot.	£21 7s. 6d. to £21 10s.	10/- to 12/6 dec.
a	Mica (in original cases) small ... per lb.	3d. to 3/-	...
a	,, ,, medium ,,	4/- to 8/-	...
a	,, ,, large ... ,,	10/- to 20/- & up	...
p	Phosphor Bronze, plane castings ,,	1/3½	...
p	,, ,, drawn bars & rods ,,	1/8	...
p	,, ,, rolled strip & sheet ,,	1/2½	...
p	,, ,, wire... ... ... ,,	1/3½	...
o	Platinum ... ... per oz.	£17 15s.	...
d	Silicium Bronze Wire ... ... per lb.	10½d.	½
r	Steel, Magnet, in bars ... ... ,,	7½d.	...
n	Tin, Block (English) ... ... per ton.	£207 5s. to £209 5s.	£1 15/- inc.
n	,, Wire, Nos. 1 to 16 ... ... per lb.	8/10	...

*For 1 cwt. lots. Special quotations against definite specifications.

Quotations supplied by

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
f India-Rubber, Gutta-Percha and Telegraph Works Co., Ltd.
g James & Shakespeare.
h Edward Till & Co.
i Bolling & Lowe.
l Richard Johnson & Nephew, Ltd.
n P. Ormiston & Sons.
o Johnson, Matthey & Co., Ltd.
p C. Clifford & Son, Ltd.
r W. F. Dennis & Co.

Annual Holidays.

The works of MESSRS. BRUCE PEEBLES & CO., LTD., will be closed for the annual holidays from July 21st to July 29th, inclusive. No goods will be received or dispatched during this period, and only urgent correspondence will be dealt with.

A Belgian Oil-Extraction Company.

Under the auspices of the Société des Centrales Electriques des Flandres et du Brabant a new company has been formed in Brussels with a capital of six million francs, and the title "the Belgian Cracking Co.," to establish works for the extraction of oils from coal and other minerals.

New Luxemburg Company.

A new company has been formed in Luxemburg (21, Avenue de la Porte Neuve), with a capital of 50 million fr., and the title La Compagnie Grand Ducale d'Electricité.

New Australian Company.

With the title Ajax Plugs (Australia) Proprietary, Ltd., a company has lately been formed in Melbourne with Australian capital to manufacture "Ajax" sparking plugs under licence from the British manufacturers.

F.M.S. Rubber Export Duty Reduced.

The Federal Council of the Federated Malay States has reduced the export duty upon rubber from two cents to one cent per lb. as from July 1st.

New French Companies.

La Société de l'Energie Electrique de la Moyenne Dordogne is the name of a new company which has recently been formed at Clermont Ferrand, with a capital of six million francs, to establish hydro-electric power stations in the Department of Dordogne. The Chambers of Commerce of six towns in the district are taking a financial interest in the new undertaking.

A company has lately been formed at Malakoff (168-172, Route de Montrouge), Seine, with a capital of 1,200,000 fr., and the title La Société Independante des Lampes Audion S.I.L.A., to manufacture radio valves.

Australian Duty on Small Motors.

The general import duty on single-phase fractional motors imported into Australia has been reduced from 60 to 10 per cent. *ad valorem*. The British preferential rate was not mentioned in the cablegram, but it is assumed that the duty has been abolished.

Irish Free State Electrical Imports.

The imports of electrical goods, excluding machinery, into the Irish Free State during May last amounted to £27,005, bringing up the total for the first five months of the year to £178,605, as compared with £162,192 in the corresponding period of 1927.

New Italian Companies.

Among the electricity undertakings recently organised in Italy are the Società Produzione Energia Elettrica, Mazara del Vallo, capital 632,000 lire; the Società Idro-Elettrica Monte Armata, Orvieto, capital seven million lire; and the Società Gas-Elettricita, Tripoli, capital five million lire.

The Berlin Radio Exhibition.

Arrangements are well in hand for the holding of the International Radio Exhibition in Berlin from August 31st to September 9th next. Intending British exhibitors can obtain particulars from the organisers at 22, Queen Elizabeth Strasse, Charlottenburg.

Charges for Ultra-violet Ray Apparatus Supply.

The Dover Electricity Committee has decided that energy used for ultra-violet ray apparatus shall be charged for on the lighting, not the heating, rate.

Lighting and Power Notes.

Aberdeen.—NAVIGATION LIGHTS.—The tower light and the jetty and all the navigation lights at the North Pier have now been converted from gas to electricity, and an electric motor has taken the place of the gas engine which formerly operated the fog bell.

Birkenhead.—LOANS.—The Electricity Committee has recommended that application be made for sanction to the borrowing of £2,200 for an 11,000-V main from Upton to Greasby, to carry the bulk supply to Hoylake and West Kirby.

Bradford. — CHANGE-OVER. — The Corporation Electricity Committee has decided that the system of supply in the following cases shall be changed over from d.c. to a.c.: Messrs. Mortimer Peel & Co.'s premises in Ludlam Street, at an estimated cost of £238; Ingleby Road and Whetley Lane district, £9,627; portion of Legrams Lane, Cottam Avenue and Terrace, and Flaxton Place, £1,100.

Brentwood.—INSTITUTION SUPPLY.—Essex County Council has reported that the Minister of Health has refused to sanction a loan for the installation of oil engines at Brentwood Hospital to provide an electricity supply. The Hospital Committee has therefore recommended the installation of the necessary plant for the utilisation of a supply of electricity from the Brentwood District Electric Co., Ltd., at the following cost: Cables and distribution, £6,328; electric wiring, street lighting and installation of motors, £11,251.

Bacup.—ELECTRICITY SUPPLY.—At a meeting of the Town Council, on July 5th, it was reported that applications for electricity continued to prove satisfactory. As the result of a conference with Rawtenstall Corporation on bulk supply, a reduction of .04d. per kWh had been secured upon the previous price. This, in turn, would be passed on to the power consumers.

Canada.—HYDRO-ELECTRIC DEVELOPMENT.—The Ontario Hydro-Electric Power Commission has issued a financial statement covering the operations of the 252 municipalities, which it supplies with electricity, for the year 1927. Revenues collected by these municipalities from electrical utilities during the year totalled $24,583,022, against which the following charges had to be met:—Cost of power, $13,652,712; operation maintenance and administration, $4,681,466; debenture charges and interest, $3,694,855; depreciation, $1,262,000. There was, therefore, a surplus of $1,291,986, and the municipalities' total surplus now amounts to more than $23,000,000, in addition to depreciation and other reserves aggregating $11,322,805. A special committee appointed by the Wisconsin Legislation is making a close investigation of the Ontario hydro-electric system, being more particularly interested in its extension into the rural districts. The Ontario system of public ownership has been regarded with interest by the people of Wisconsin in connection with projects for the development of the water powers of that State. The recommendations of the present Committee, after an extended tour of the districts served by the Hydro-Electric Power Commission, will enable the Legislature to determine the policy to be adopted.

Clitheroe.—YEAR'S WORKING.—At the end of its first year the Corporation's electricity undertaking showed a gross profit of £1,696. Under an agreement with the Lancashire Electric Power Co., the minimum payment for electricity was to be £500 for the first year, but the Corporation actually paid £1,235 for supplies.

Erith.—LOAN.—The Urban District Council has applied for sanction to a loan of £4,596 for supplying electricity to the premises of the Thames Milling Co. The Council has also arranged to give a supply to Cannon & Gaze, Ltd., who are completely electrifying their mills, and the cable is to be extended at a cost of £331.

Faversham.—YEAR'S WORKING.—The accounts of the Corporation electricity undertaking (engineer: Mr. G. Sommerville) for the year ended March 31st last record a total income of £12,774 and working expenses of £6,941, leaving a gross profit of £5,833, to which was added revenue from other sources, making a total of £6,414. Capital charges absorbed £5,064, and there was a net surplus of £1,350. The electrical energy sold amounted to 682,508 kWh, and the maximum supply demanded to 400 kW.

Fleetwood.—ELECTRICITY SUPPLY PROGRESS.—It was reported at a recent meeting of the Urban District Council that approximately 70 per cent. of the houses in Fleetwood are now provided with electricity.

Glasgow.—PROGRESS DURING MAY.—The Corporation electricity manager reports that during May 455 houses were wired under the Department's scheme, making the total to date 8,233, and that 201 applications for hire of appliances were made, making the total 19,585.

MAINS EXTENSIONS.—The Electricity Committee has recommended extensions of distributing mains at a cost of £6,813.

Grays.—NEW ELECTRICITY CHARGE.—The Urban District Council has adopted a new alternative tariff for electricity supplied to private houses for lighting, cooking and heating, &c., based on 10 per cent. of the ratable value per annum, plus 1½d. per kWh.

Hull.—YEAR'S WORKING.—We have received from Major H. Bell a copy of his report on the working of the Corporation electricity undertaking for the year ended March 31st last. The total revenue amounted to £380,695, and working expenses were £195,598, leaving a gross profit of £185,097. The previous year's figures were: Income, £412,960; working expenses, £235,797; gross profit, £177,163. To the gross profit was added an unemployment grant of £3,883, making a total of £188,980, and, after payment of capital charges, there was a net surplus of £86,249, as compared with £84,595 in the preceding year. The capital expenditure during the year amounted to £227,275, the chief items being £49,062 for buildings, £135,167 for machinery, and £33,530 for mains and services. The sales of electricity increased from 61,523,774 to 70,289,545 kWh, and the maximum supply demanded from 25,100 to 27,700 kW. The average price obtained per kWh fell from 1.57d. to 1.26d. Good progress was made during the year with the work of installing two 12,500-kW sets, which will increase the capacity of the station to 54,000 kW, and one of the sets had satisfactorily run its preliminary trials.

LOANS.—The Corporation Electricity Committee is applying for sanction to the following loans: Feeders, including pillars and switchgear, £91,813; buildings, £3,841; plant, £52,440.

Inverness.—STREET LIGHTING.—The Town Council has decided by a large majority to light the principal streets of the town by electricity.

Llanfairfechan.—INAUGURATION OF SUPPLY.—The Urban District Council's electricity scheme was recently inaugurated. The Council is taking a bulk supply from the North Wales Power Co.'s system, and is distributing on the three-phase, four-wire system. The number of consumers at present connected is 250, and it is anticipated that within the next 12 months this number will be nearly doubled. The street lighting is to be converted to electricity. The consulting engineer for the scheme is Mr. Price F. White, borough electrical engineer, Bangor, and the clerk of works and resident engineer is Mr. G. Ll. Owen. The contractors for the cable were the British Insulated Cables, Ltd., and the switchgear and transformers were supplied and erected by the English Electric Co., Ltd.

London.—BERMONDSEY.—The Borough Council Electricity Committee has obtained sanction to borrow £59,000 for the provision of a new sub-station at the Neckinger.

Northern Ireland.—LURGAN.—The Northern Ireland Electricity Commissioners have approved the Town Council's application for sanction to a loan of £10,000 for the proposed electricity undertaking.

Oxford.—PROPOSED PURCHASE OF UNDERTAKING.—The City Council will hold a special meeting on July 23rd to consider a recommendation by the Electricity Committee that the Corporation shall purchase the electricity undertaking in the city. An order by the Ministry of Transport has reduced the statutory maximum price for electricity to 8d. per kWh, as from July 1st.

Plymouth.—LOAN SANCTIONED.—The Corporation Electricity Committee has obtained sanction to a loan of £5,000 in respect of equipment of sub-stations on consumers' premises.

COOKERS IN SCHOOL.—The Committee has agreed to proposals submitted for the loan of electric cookers to the Education Department for use in cookery schools, and also for the appointment of a lady demonstrator.

Price Reductions.—Reductions in the charges for electricity have been made or recommended in the following districts:—

CHELMSFORD.—*The Electric Supply Corporation, Ltd.*—Lighting: From 7½d. to 6½d. per kWh.

CREWE.—Lighting: From 4½d. to 4d. per kWh, less 2½ per cent. for prompt payment of accounts.

HIGH WYCOMBE.—*The Wycombe (Borough) Electric Light and Power Co., Ltd.*—Power: First 3,000 kWh per quarter, 3d. per kWh; next 5,000 kWh, 2d.; over 8,000 kWh, 1½d. per kWh.

SOUTHPORT.—Lighting: Flat rate, from 4½d. to 4d. per kWh; maximum demand rate for business premises, from 1½d. to 1d. per kWh for all over 365 kWh per kW of maximum demand per annum. Inclusive domestic tariff for residential premises only: Fixed quarterly charge per scheduled room, from 3s. to 2s. 6d., and the "unit" charge from ¾d. during the winter quarters to ½d., making the charge ½d. per kWh throughout the year. Theatres: Special rate reduced from 4d. to 3d. per kWh.

CHESTER (within the City Boundary).—Lighting: From 4½d. to 4¼d. per kWh. Industrial heating and cooking: From 1d. to ¾d. per kWh. Power: First 1,000 kWh per quarter, from 2½d. to 2d. per kWh; next 1,000 kWh, from 2d. to 1½d.; all energy in excess of this amount, 1¼d. per kWh. Factories: The charge of £1 per kW of demand per quarter, plus .75d. per kWh, reduced to 6s. 8d. per kW of maximum demand per month, plus .7d. per kWh, with a discount of 5 per cent. for prompt payment of accounts; off-peak demand, 5s. 4d. per kW of maximum demand per month, plus .7d. per kWh.

HAWARDEN.—Lighting: From 8d. to 7½d. per kWh. Power: From 2½d. to 2¼d. per kWh. A discount of 5 per cent. for prompt payment.

Sheffield.—MAINS EXTENSIONS.—The Corporation Electricity Committee has authorised mains extensions at a cost of £12,250.

Southport.—YEAR'S WORKING.—The accounts of the Corporation electricity undertaking (engineer: Mr. E. Moxon) for the year ended March 31st last show a total income of £105,627, as compared with £104,741 in the preceding year. Working expenses decreased from £56,380 to £49,871, leaving a gross profit of £55,756, as against £48,361, to which was added interest and an unemployment grant, making a total of £56,900. Capital charges absorbed £33,848, and there was a net surplus of £23,051, as compared with £18,342 in 1926-27. The capital expenditure during the year amounted to £64,254, and included £21,557 for plant, machinery, &c., and £30,352 for mains and services. The electrical energy sold increased from 8,768,902 to 10,874,806 kWh, and the maximum supply demanded from 4,938 to 5,980 kWh. The average price obtained per kWh fell from 2.47d. to 2.04d. During the year a 6,000-kW Brush-Ljungström set was put into commission, bringing the total capacity of the station up to 13,500 kW.

Special Orders.—Application is being made to the Electricity Commissioners by the Aldershot Gas, Water & District Lighting Co., for Special Orders authorising it to supply electricity in the rural districts of Midhurst, Petworth, Thakeham, and Horsham, and authorising the Hindhead & District Electric Light Co., Ltd., to sell and transfer to the company the undertaking authorised by the Hindhead & District Electric Lighting (Extension) Order, 1909.

The Commissioners have submitted to the Minister of Transport for confirmation a Special Order made by them authorising Colchester Corporation to supply electricity in the urban districts of West Mersea and Wivenhoe, and parts of the rural districts of Lexden and Winstree, Maldon, Tendring, and Samford.

Worcester.—YEAR'S WORKING.—The accounts of the City Council's electricity undertaking (engineer: Mr. C. M. Shaw) for the year ended March 31st last show a total revenue of £77,300, as compared with £67,834 in the preceding year. Working expenses decreased from £42,651 to £26,407, leaving a gross profit of £40,892, as against £25,183. Capital charges absorbed £64,971, and there was a net surplus of £12,329, as compared with £3,770 in 1926-27. The expenditure on capital account during the year amounted to £47,800, and included £19,463 for mains and services. The electrical energy sold increased from 9,222,784 to 11,647,783 kWh, and the maximum load from 5,789 to 6,652 kW. A new 7,500-kW set was put into commission last autumn.

Tramway and Railway Notes.

Burnley.—YEAR'S WORKING.—The accounts of the Corporation tramway undertaking (general manager: Mr. H. Mozley) for the year ended March 31st last record a total revenue of £161,237, and working expenditure of £133,758, leaving a gross profit of £27,479. The figures for the preceding year were: Income, £160,215; working expenses, £125,577; gross profit, £34,637. Against this the following charges had to be met: Capital charges, £17,358; rents for tramways owned by outside authorities, £2,696; deficit on motor-omnibus service, £845; income tax, £3,321. There was therefore a net surplus of £3,259, as compared with £9,268 in the preceding year. The number of passengers carried increased from 22,662,789 to 24,040,353, and the car miles run from 1,923,679 to 2,125,543.

TRACK RENEWALS.—The Corporation Omnibuses Committee has considered future track re-laying, and a special committee has been appointed to inquire into the whole question and to report to a future meeting, with particular reference to: (1) Amount of track re-laying still to be carried out, the estimated cost, and the amount and duration of the annual charge to the undertaking consequent thereon; (2) the interval elapsing before relaying must recommence after completion of the work under heading (1); and (3) the estimated income available to provide for the annual expenditure required under heading (1).

Continental.—POLAND.—With the support of the Municipal Council, a company is being organised in Oswiecim, Teschen, Silesia, to establish a plant for the utilisation of the water power of the Sola River. The Ministry of Communications has granted the necessary concession for the project, and the company's intention is to erect a station which will furnish electricity for operating a standard gauge electric railway between Oswiecim and Zywiec. This is part of a programme for popularising the Oswiecim district as a tourist resort, and also for developing the mineral resources of this section of the country.

Dearne District Light Railways.—EXTENSION OF TIME.—The Dearne District Light Railways Joint Committee is applying to the Minister of Transport for a prolongation to June 24th, 1929, of the time prescribed for the completion of works authorised by the Dearne District Light Railways Orders, 1915 to 1924.

Glasgow.—YEAR'S WORKING.—We have received from the general manager of the Corporation tramways (Mr. Lachlan Mackinnon) a copy of his report and statement of accounts for the year ended May 31st last. The total income amounted to £2,385,929, as compared with £2,345,207 in the preceding year, and working expenses were £1,660,055, as against £1,676,417, leaving a gross profit of £725,874 (£668,790), to which was added interest on investments amounting to £85,875, making a total of £811,749 available. From this the following charges were deducted:—Interest, £108,242; sinking fund, £64,431; property and income tax, £56,322; Parliamentary expenses, £544; depreciation and permanent-way renewals fund, £535,264. The net result, therefore, was a surplus of £46,946, as compared with a deficit of £33,178 in the previous year. The subway section showed a total revenue of £100,061, as compared with

£95,036 in 1926-27. Working expenses decreased from £108,349 to £98,524, and there was a gross profit of £1,537, but after providing for interest and sinking fund charges there was a net deficit of £20,990, as compared with £35,497 in the previous year. There was also a loss of £996 in the motor-omnibus service, and the net result for the whole undertaking was a surplus of £19,754, as against a deficit of £78,632 in 1926-27. The amount spent on capital account during the year was £134,446, the chief item being £61,140 for permanent way. The total now expended on the undertaking stands at £6,886,713. The number of passengers carried showed a considerable increase, from 419,970,823 to 466,142,258, and the number of car miles run rose from 33,564,569 to 34,789,110. The average traffic revenue per car mile fell from 16.74d. to 16.42d. The electrical energy consumed increased from 59,094,191 to 64,039,138 kWh.

London.—L.C.C. TRAMWAYS.—In his annual review, Col. Levita, chairman of the L.C.C., states that it is gratifying to note that the estimated net deficiency in respect of the Council's tramways shows a reduction from £225,000 to £104,000. Until better co-ordination of local traffic facilities in Greater London is secured it must be difficult for the Council to avoid some deficiency as the result of the working of its tramway undertaking. Considerable attention has, however, been devoted to improvements in the methods of working, with a view to effecting economies and popularising the undertaking. With the latter object cars are being reconditioned and made more comfortable, through-running arrangements and transfer facilities have been further extended, the period of availability of midday fares has been increased, the 1s. daily ticket has been extended to additional routes, and during the summer months 6d. daily tickets for children with the same availability as the 1s. daily tickets for adults have been issued.

Manchester.—YEAR'S WORKING.—We have received from Mr. H. Mattinson, general manager and chief engineer of the Corporation tramway undertaking, a copy of his annual report, together with the abstract of accounts for the year ended March 31st last. The revenue account shows a total income of £1,856,592, as compared with £1,763,280 in 1926-27. Working expenses amounted to £1,476,480, as against £1,451,659, leaving a gross profit of £380,112 (£311,621), to which was added interest on investments, unemployment relief grants, and a balance from the motor-omnibus service, making a total of £405,725 available. This was disposed of as follows: Interest on capital, £113,171; redemption of debt, £107,060; street improvements, interest and sinking fund, £10,542; rent of leased lines, &c., £28,815. The net surplus was, therefore, £146,138, which was transferred to the renewals fund. The previous year's working resulted in a surplus of £46,076. The capital expenditure during the year amounted to £415,496, and include £50,142 for permanent way, £158,605 for land and buildings at depôts, and £196,788 for rolling stock. The total now spent on the undertaking stands at £4,166,602. The number of passengers carried increased from 310,559,874 to 328,013,199, and the car miles run from 22,783,254 to 24,182,506. The total revenue per car mile fell from 18.567d. to 18.426d., and the total consumption of electricity increased from 43,900,518 to 46,966,311 kWh. During the year six double-truck cars were reconstructed, 22 single-truck cars converted into vestibule double-truck cars, and a further 43 cars put into service. Reconstruction of permanent way was carried out in 22 streets.

Scarborough.—LOAN.—The Town Council proposes to renew an application made some time ago for sanction to borrow £5,500 for the construction of a cliff tramway from the Aquarium.

South Shields.—YEAR'S WORKING.—The accounts of the Corporation tramway undertaking (general manager: Mr. J. Austin Baker) for the year ended March 31st last record a total income of £74,010, as compared with £65,112 in the preceding year. Working expenses amounted to £55,169, as against £48,100, leaving a gross profit of £18,841 (£17,013), to which was added revenue from other sources making a total of £21,738. After deducting capital charges, making contributions to the sinking fund, and repayment of mortgage loans, there was a balance of £2,197. The motor-omnibus service, however, showed a loss of £1,537, and the net surplus, therefore, transferred to reserve was £660, as compared with a deficit of £2,355 in the previous year. The number of passengers carried increased from 14,273,993 to 16,648,606 ('buses 1,464,161), and the car miles run from 1,126,585 to 1,331,976 ('buses 285,639). The average traffic revenue per car mile increased slightly from 16.7353d. to 16.7360d.

Southern Railway.—COLLISION.—A collision which occurred near London Bridge station on July 9th caused considerable delay to the train services. An official report issued by the Southern Railway Co. states that at 7.25 p.m., just after the 7.22 p.m. electric train from London Bridge to Epsom Downs left No. 12 platform, it collided with an engine which was making a shunting movement from No. 11 low level platform. One passenger was killed, six rather seriously injured, and four others received minor injuries. All the ten injured were detained at Guy's Hospital. Two coaches and a light engine were derailed. There were eight coaches altogether on the train, but six of them were unharmed.

Telegraph and Telephone Notes.

Australia.—TELEGRAPH TRAFFIC.—The figures representative of the cable and wireless traffic from April, 1927, to March, 1928, covering the first year of the beam radio-telegraph service, show that the latter obtained slightly over one-half of the total of the United Kingdom traffic. The total figures for all classes are 14,136,000 words, of which the beam service secured 7,131,000, the Pacific cable 3,050,000, and the Eastern cable system 3,920,000, the combined cable services being 161,000 words behind the beam service, says the *Financial News*. The fact that cable services carried nearly 7,000,000 words of the United Kingdom traffic alone indicates that they are still an important factor in Australia's communication problem. The cable services retain the major portion of the commercial traffic, the radio beam proportion of the full-rate messages being only 30 per cent., but it secured three-fourths of the week-end and daily letter traffic. The cables obtained the larger share of the deferred Government and Press messages and of the Christmas and New Year greetings.

Canada.—"BEAM" RADIO LICENCE.—The Canadian Government has issued a licence to the Canadian Marconi Wireless Telegraph Company for the establishment of a service between Montreal and New York. A contract has been entered into with the Radio Corporation of America.—*Reuter.*

Jersey.—TELEPHONE SERVICE.—Mr. J. H. Stanhope, engineer-manager of the Jersey States Telephone Department, informed the staff, at its annual outing, that since the Channel Islands service was taken over from the British Post Office in 1923, they had, by instituting a business system of advertising, salesmanship, and service, practically doubled the number of subscribers; actually they were just five short. In 1923, at the time of change there were only 1,600 subscribers; to-day there were 3,195 satisfied subscribers, and the tariff was only one-half that of the former English service.

Northern Ireland.—NEW CABLES.—At a recent meeting of the Londonderry Chamber of Commerce the Postal and Telegraph Committee of the Chamber was reappointed for the ensuing year. Councillor Magee availed himself of the occasion to inform the Chamber that he had learned that a new telephone cable was to be laid from Great Britain to Donaghadee. He considered that at the same time a telegraph cable should be included, which would restore the direct communication which Londonderry had with Great Britain in former years. As it was, there was very considerable delay in telegraph communication owing to the necessity for the retransmission of messages. The Chamber decided to appoint Councillor Magee on the Postal and Telegraph Committee with a view to seeing to this matter.

The Telephone Service.—RURAL CALL OFFICES.—A deputation representative of all parties, appointed at a recent meeting of members of the House of Commons, visited the General Post Office on July 3rd to urge the necessity for revision of the Regulations relating to guarantees demanded by the Department for the provision of public telephone call offices in rural areas. According to *The Times*, Sir Douglas Newton, in introducing the deputation, pointed out that during the past three years 268 villages had been required to give guarantees, aggregating £15,000, for the provision of public telephones, yet the guarantors had been called upon only to the extent of £2,827 per annum. It was urged accordingly that the guarantees demanded had in practice proved excessive, and had resulted in the restriction of telephone development in rural areas. The suggestion was made that for the future the Post Office should share the risk, or, failing that, institute an adequate development fund to meet the expenses incurred during the first few years of the installation of telephones in remote districts. Mr. Leech, on behalf of the General Post Office, expected shortly to be in a position to take steps which it was hoped would make it easier for rural communities to become telephone users.

ROCHDALE AUTOMATIC SYSTEM.—At midnight on July 7th the Mayor of Rochdale (Councillor Clarke) performed the opening ceremony of the transfer of the Rochdale, Castleton, Heywood, Littleborough, Milnrow, Norden, Shaw, and Whitworth telephone systems to automatic working.

UNIVERSITY COLLEGE, NOTTINGHAM.—The new University College, Nottingham, which was formally opened by the King on July 11th, is equipped with a private automatic telephone exchange for inter-departmental communication. The switchboard installed is one of a series specially developed by Ericsson Telephones, Ltd., for small private installations. The initial equipment of 32 lines and 5 links, or connecting circuits, can be increased to 44 lines and 7 links, and by means of an additional panel an ultimate capacity of 89 lines and 14 links will be obtainable.

Transatlantic Communication.—MAGNETIC STORM.—Considerable interference with the transatlantic submarine cable and radio-telegraph services was experienced last week-end, owing to a magnetic storm which made itself felt at midnight on Saturday, July 7th, the effects being pronounced.

Radio Notes.

Canada. — INTERFERENCE ELIMINATION. — Throughout the Dominion in town and village practically all electric power is carried overhead on poles; 80.7 per cent. of the interference with broadcast reception reported last year was traced to overhead electrical distributing systems or power lines. All the revenue, amounting this year to approximately £40,000, derived from receiving licences is devoted in Canada to the suppression of electrical interference. This service, undertaken by the Radio Department of the Ministry of Marine and Fisheries, Ottawa, now covers the whole country. Fifteen cars visit in the course of the year most of the principal towns in Canada, and are touring the prairie provinces now that the roads are open. The most important apparatus carried on the cars consists of a superheterodyne receiver with a direction-finding loop, by means of which the investigator is able to associate interference, reported to him by listeners or dealers, with certain particular lines. The cars also carry small portable receivers fitted with exploring coils for investigations in power houses. In case interference is not to be heard when the investigator visits the town from which it has been reported, he endeavours to produce artificially such conditions as will cause the interference to start. Having the permission of the public utility companies to do so, he strikes poles carrying transformers and other electrical apparatus and shakes the guy-wires, causing the power lines to swing and vibrate as they would in windy weather, or when heavy traffic passes along the road. At the same time his companion in the car listens with ear-phones for electrical interference set up in the system by the vibrating pole, causing a bad contact or poor insulation to become apparent, and when the source is found the public utility companies take steps to repair the fault; if found to originate in some privately-owned electrical apparatus the owner is asked to take steps to eliminate the interference, and in this case the investigator assists the owner in testing his apparatus; where it is caused by the normal operation of electrical apparatus, the investigator will try the effect of various types of preventive devices which are carried in the car. When it is possible to prevent the interference by such means, generally the owner will buy equipment which is supplied at cost from the Radio Department, to stop the nuisance. Frequently, radio interference indicates defects which may in time cause serious damage from fire, electric shock or damage to plant; so in a number of cases the companies themselves employ electricians to detect and prevent radio interference. Local wireless clubs and wireless dealers co-operate with the investigators in this vital service to listeners. Feeling is so keen that there is a general drive to clear up the trouble in towns where interference is most persistent. *World-Radio* gives the following summary of the sources of interference investigated during the year ended March 31st last, and the results:—

Sources investigated—		
Domestic electrical appliances ...	291	5.3%
Electrical power lines	4,383	80.7%
Commercial electrical apparatus ...	610	11.2%
Radio apparatus (amateur and commercial)	152	2.8%
Total sources investigated ...	5,436	100.0%
Action taken—		
Number of sources definitely reported cured	4,880	89.8%
Number of sources not yet reported cured	465	8.5%
Number of sources having no economic cure	91	1.7%
Total	5,436	100.0%

United States — HIGH-POWER STATIONS.—During its annual meeting in Chicago in June the Radio Division of the National Electrical Manufacturers' Association favoured the increased use of higher power by broadcasting stations, and also recommended to the Secretary of Commerce that radio inspectors working under him be supplied with adequate apparatus for the accurate measurement of the carrier frequencies of broadcasting stations. During the last session of Congress, many voices were raised against the use of high power by broadcasting stations, the loudest of which was that of Mr. Ewin L. Davis, of Tennessee, who boldly announced that 10,000 watts was the largest power which should be permitted any broadcasting station, but the attitude of the Transmitter Section of the National Electrical Manufacturers' Association, expressed at its annual June meeting, is in direct opposition to that of Representative Davis and those others who sympathised with him.

Contract Information.

When "Contracts Open" are advertised in our "Official Notice" pages, the date of the ELECTRICAL REVIEW containing the advertisement is given in parentheses below.

Contracts Open.

Atherton.—July 31st. Urban District Council. E.h.p. cable. (See this issue.)

Australia.—MELBOURNE.—Electricity Commission of Victoria. August 6th. Neutral earthing compensator. (B.X. 4519.)*

August 20th. 66,000-V transformers and spares. (B.X. 4541.)*

September 10th. Synchronous condenser and accessory plant. (B.X. 4545.)*

October 31st. Water-tube boilers, with auxiliary and accessory equipment.

SYDNEY.—August 29th. N.S.W. Government Railways. Two 20,000-kW turbo-alternators and condenser plant for Ultimo power house.

September 12th. One 60-ton electric overhead travelling crane for Ultimo power station. Chief Electrical Engineer, 61, Hunter Street, Sydney.

Belfast.—July 16th. Electricity Committee. One transformer kiosk, with h.p. and l.p. switchgear. (July 6th.)

Belgium.—July 19th. Municipal authorities of Schaerbeek, Brussels. 5,000 metres of l.p. armoured cable. Particulars for 2½ fr. from Service d'Electricité, Hotel Communal, Schaerbeek.

Bromsgrove.—July 28th. Board of Guardians. Electric lighting installations at the workhouse infirmary and children's home. (See this issue.)

Dundee.—July 26th. Corporation Cleansing Department. Complete refuse disposal plant, including machinery for separation, two three-cell destructor units, boiler, chimney stack, storage bunkers, receiving hoppers, conveyors, &c. Specification (two guineas) from Mr. W. H. Sagar, cleansing superintendent.

Town Council. Electric lighting installation for 120 houses. Schedules, &c., from Mr. G. Baxter, director of housing.

Egypt.—CAIRO.—October 3rd. General Management. Telephone trunk cable, Cairo-Alexandria. Specifications from Chief Inspecting Engineer, London, S.W.—*Reuter's Trade Service* (Cairo).

Glasgow.—The Corporation Cleasing Department is inviting tenders for the installation of electric light, &c., in the reconstructed depôt at Govan.

Harrogate.—July 17th. Electricity Department. Two 50,000-lb. boilers with pipework and accessories. (June 29th.)

Lourenco Marques.—August 30th. Ports and Railways Administration. Electrolytic copper cable, r.i. copper wire, &c. (B.X. 4565.)*

Loughborough.—July 21st. Electricity Department. One rotary or motor-convertor, with a.c. switchgear. (July 6th.)

London.—CENTRAL ELECTRICITY BOARD.—July 27th. South-East England electricity scheme. 33,000-V overhead transmission line between Brighton and Worthing. (June 29th.)

LONDON COUNTY COUNCIL.—July 23rd. Installing electric lighting, bells and power at the Weights and Measures Office, Euston Road. (See this issue.)

POPLAR.—July 25th. Board of Guardians. Two 25-h.p. electric motors with control panels, cable, &c. (See this issue.)

BETHNAL GREEN.—July 26th. Borough Council. Electric lighting installation at "Museum Buildings," Green Street, and Ravenscroft, Columbia Road. (See this issue.)

Luxemburg.—July 10th. The Compagnie Grande Ducale d'Electricité du Luxembourg, of 21, Avenue de Porte Neuve, Luxemburg. Establishment of a h. and l.p. distribution system in the Grand Duchy of Luxemburg.

Newry.—July 21st. Urban District Council. Two 100-b.h.p. (approx.) and one 150-b.h.p. (approx.) heavy-oil engines, each direct coupled to a l.p. 3-phase alternator; l.p. switchboard; one 5-ton overhead travelling crane; underground and overhead distributing mains and services and street-lighting installation. (June 29th.)

Newport (Isle of Wight).—July 16th. Education Committee. Electric lighting installation at the Secondary School. Mr. S. R. Cocks, county surveyor, St. Thomas Street, Ryde.

Salford.—August 13th. Electricity Department. One 20,000-kW turbo-generator set with condenser and auxiliaries. (See this issue.)

Shoeburyness. — July 16th. Electricity undertaking. Underground mains, switchgear, transformers, &c. (June 29th.)

Silkstone.—July 17th. West Riding Education Committee. Electric lighting and electric bell installations at Silkstone new school. Specifications from Education Committee.

South Africa.—JOHANNESBURG.—South African Railways and Harbours. August 9th. Six electrically-driven overhead travelling cranes. (A.X. 6409.)* 50-kVA transformers and 2,100-V truck-type switchgear. (B.X. 4526.)*

CAPE TOWN.—July 25th. City Council. A.c. meters. (B.X. 4527.)*

August 15th. L.p. switchgear for Murzenberg, New Pavilion. (B.X. 4562.)*

UITENHAGE.—July 30th. Municipal Council. H.p. and l.p. switchgear, h.p. and l.p. cable, motors, fans, transformers, transformer kiosks, &c. (B.X. 4517.)*

BULAWAYO.—August 14th. Municipal Council. One water-tube boiler with chain grate, one turbo-alternator, spray cooling equipment with circulating water piping, one 3-panel switchboard. (A.X. 6454.)*

Tilbury.—July 16th. Urban District Council. Complete electric lighting, cooking, and heating installations for 315 houses on the new housing estate. (July 6th.)

Uruguay.—August 22nd. State Electricity Department. Gasfilled metal-filament lamps. (B.X. 4560.)*

Warrington. — July 30th. Electricity Department. 12 months' supply of e.h.p. and l.p. cables; e.h.p. sub-station switchgear, and 12 months' supply of reinforced-concrete cable protector slabs, tiles and hard-burned red tiles. (See this issue.)

Waterford.—August 3rd. Corporation. 10,000-V and 400-V 3-phase and 200-V d.c. switchgear. (July 6th.)

*Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed.

Birkenhead.—Electricity Committee. Accepted:—
Cable: (£299), Hackbridge Cable Co., Ltd.; (£1,226), Macintosh Cable Co., Ltd.
H.p. mains (£471).—Macintosh Cable Co., Ltd.
Switchgear cubicles (£220).—English Electric Co., Ltd.; (£202), British Thomson-Houston Co., Ltd.
Tubes (£65).—Ferguson Superheaters, Ltd.

Burton-on-Trent.—Electricity Committee. Accepted:—
Switchgear in connection with supply to new factory for Pirelli's (£1,360).—Metropolitan-Vickers Electrical Co., Ltd.

Cheltenham.—Urban Council. Accepted:—
Cables for 12 months (schedule prices).—British Insulated Cables, Ltd.
Meters.—Electrical Apparatus Co., Ltd., Metropolitan-Vickers Electrical Co., Ltd., and Edison Swan Electric Co., Ltd.
Transformers (£815).—Ferranti, Ltd.

East Dereham.—Urban District Council. Accepted:—
Cables (£3,605).—Johnson & Phillips, Ltd.

Glasgow.—Electricity Committee.
Ironclad switchgear for Well Street, Drury Street, and Cleland Lane sub-stations.—A. Reyrolle & Co., Ltd. (£8,694). (Recommended.)
Steam pipes for soot blowers of air preheaters at Dalmarnock Power Station.—Stewarts & Lloyds, Ltd. (Accepted.)

Tramway Committee. Accepted:—
Weldless chains for cars.—Weldless Chains, Ltd.
Electro-magnets.—Metropolitan-Vickers Electrical Co., Ltd.
Ten miles of trolley wire.—Felten & Guilleaume and Thomas Bolton & Sons, Ltd.

Health Committee. Recommended:—
Electric lighting installation at workmen's houses, Bellefield Sanatorium.—Johnston, Park & Co.

Finance Committee. Accepted:—
Installation of electrical gear, &c., for St. Andrew's Hall grand organ (£251).—Joseph Brooks & Co.

Hamilton.—Town Council. Accepted:—
Converting plant (£1,631).—Harland Engineering Co., Ltd.

Hull.—Works Committee. Accepted:—
Electrical pumping machinery for East District pumping station (£2,753).—Worthington-Simpson, Ltd.

Leek.—Town Council. Accepted:—
One 400-kW and one 200-kW rotary transformers and starting panel (£2,338).—Crompton-Parkinson, Ltd.

Electricity Committee. Accepted:—
Cables.—(£1,692), Macintosh Cable Co., Ltd.; (£1,823), Greenwich Cable Works, Ltd.; and (£1,368), Enfield Cable Works, Ltd.

Finance Committee. Accepted:—
Installation of electric winding and control gear at Town Hall clock (£207).—William Potts & Sons, Ltd.

Liverpool.—City Council. Recommended:—
Ash-handling plant (£2,995).—Babcock & Wilcox, Ltd.
One special bogie tramcar (£2,450).—English Electric Co., Ltd.
Tramway junctions and cross-over (£1,175 and £1,236).—Hadfields, Ltd.; (£1,960), Edgar Allen & Co., Ltd.

London. — WANDSWORTH. — Libraries Committee. Accepted:—
Wiring branch libraries for electric lighting, fittings, &c.—Balham: (£169), Mr. L. J. Godfrey. Clapham: (£205), County of London Electric Supply Co., Ltd. Tooting: (£62), Alpha Manufacturing & Electrical Co., Ltd.

POPLAR.—Electricity Committee. Accepted:—
Repairing transformer at High Street sub-station (£250).—Westminster Engineering Co., Ltd.

ROYAL MAIL STEAM PACKET CO. Accepted:—
Electric lamps for 12 months.—Edison Swan Electric Co., Ltd.

Manchester.—Electricity Committee. Accepted:—
One 15,000-kVA static transformer for Stuart Street power station.—Ferranti, Ltd.
H. and l. pressure pipe work, &c., for steam heating services.—H. Bamford & Co.
Five 125-kVA static transformers.—Fuller Electrical and Manufacturing Co.
Cable.—British Insulated Cables, Ltd.

Education Committee. Accepted:—
Electric lighting installation, Cheetham municipal school.—Seddon & Sons.

Oldham.—Electricity Committee. Accepted:—
Motor starters.—Metropolitan-Vickers Electrical Co., Ltd.
Switchboard for boiler house at new power station.—Ferguson-Pailin, Ltd.

Portsmouth.—Electricity Committee. Accepted:—
Four 500-kVA transformers (£980).—Hackbridge Electric Construction Co., Ltd. Three 250-kVA ditto (£429).—Johnson & Phillips, Ltd.
Cable (£824).—Johnson & Phillips, Ltd.

Rugby.—Urban Council. Accepted:—
Service cable (£293).—British Insulated Cables, Ltd.

Sheffield.—Electricity Committee. Accepted:—
Reconstruction of three 500-kVA Scott-connected transformer sets, one 1,000-kVA set and three 250-kVA transformers (£1,674).—British Electric Transformer Co., Ltd.

South Africa.—CAPE TOWN.—Electricity Committee. Accepted:—
15 tons copper wire (£1,262).—British Insulated Cables (S.A.), Ltd.
55 tons (various) copper wire (£4,633).—Dowson, Dobson and Behr, Ltd.
Eight tons galvanised stay wire (£125).—Hochschild & Co.
Cables.—A. J. G. Simpson (£2,942); W. T. Henley's (S.A.) Telegraph Works Co., Ltd. (£462).
Switchgear (£2,332).—Davis & Soper, Ltd. (Reyrolle manufacture).

West Lothian.—Education Authority. Accepted:—
Electric lighting installation at Armadale School Extension.—T. Laurie & Co.; at Education Office Extension.—G. Birrell.

Wimbledon.—Electricity Committee. Recommended:—
11,000-V main between the power station and High Street sub-station (£2,864).—Siemens Bros. & Co., Ltd.

Forthcoming Events.

Manchester Colliery and General Engineering Exhibition.—City Hall, Manchester. July 10th-21st.

Overhead Lines Association.—Wednesday, July 18th. Visit to Mr. R. Borlase Matthews's farm at East Grinstead.

The "Electrical Review" Service Department.

INQUIRIES must be accompanied by a stamped addressed envelope.

We should be glad to learn the names and addresses of makers of the following:—
F.O.N. hair dryers.

Notes.

The Fuel Conference, London, 1928.

The list of papers to be presented at the Fuel Conference in September by British authors indicates that the numerous interests concerned in the subject have bestirred themselves to some purpose. Forty-one papers are tabulated, in almost every section of the programme, the authors being well-known authorities in their respective spheres; in each case an "authoritative body" is also named. In addition to the numerous essays on the treatment and handling of coal and oil, and on combustion and carbonisation, there are many of direct interest to the electrical engineer, especially the following: "Economic Utilisation of Fuels in the Production of Electricity," by Mr. R. P. Sloan; "Fuel Oil for Steam Raising," by Com. A. L. P. Mark-Wardlaw; "Industrial Electric Heating," edited by Mr. S. E. Monkhouse; "A Comparative Study of Solid Fuel, Gas, Electricity and Oil for Domestic Purposes," by Dr. Margaret Fishenden; "Pulverised Fuel," by Mr. F. H. Rosencrants; and "Transmission of Power," edited by Dr. E. W. Smith.

A provisional time-table and list of 167 papers has now been issued.

Applications for membership forms should be addressed to the Secretaries, Fuel Conference, 1928; World Power Conference, 36, Kingsway, W.C.2.

Sydney Bribery Charges.

The Sydney correspondent of the *Daily Telegraph* reports that four summonses have been issued under the Secret Commissions Prohibiting Act, arising out of the recent corruption inquiry in the cases of Babcock & Wilcox, Ltd., Mr. Maling, Mr. Arnot and ex-Alderman Green. The summons in the Babcock & Wilcox case states that £10,600 was corruptly given to Mr. Maling. The summons against Mr. Arnot states that he was privy to certain acts in contravention of the Secret Commissions Act. Mr. Maling is charged with receiving £10,600. Ex-Alderman Green is charged with receiving £7,500 as a consideration for recommending the Sydney Municipal Council to accept the Babcock & Wilcox tender for machinery for the Sydney power house, and voting for its acceptance.

Appointments Vacant.

Assistant draughtsman for the Islington Corporation Electricity Department. Technical representative (distribution) for the West Midlands Joint Electricity Authority. Constructional engineer (temporary) (£7 7s.) for the Portsmouth Corporation Tramways and Motor Omnibus Department. Two district consumers' engineers (£200-£250) for the West Gloucestershire Power Co., Ltd. Instructor in electrical installation for the Kingston-on-Thames Technical College. Electrician-in-charge (£291) for the Hornsey Borough Council Electricity Department. (See our advertisement pages to-day.)

Association of Mining Electrical Engineers.

Upwards of eighty members of the South Wales Branch of the Association of Mining Electrical Engineers paid a visit to the generating station of the South Wales Power Co. at Upper Boat on Saturday, July 7th. After an interesting tour of inspection, they were entertained to tea by Mr. J. W. Beauchamp, chief engineer and general manager, who, in extending a hearty welcome to the party, said his board had decided to adopt a much bolder policy than it had followed in the past. They had a power station which was a credit to the consulting engineers and to Mr. Roper, the station superintendent. Their costs of production were low, but what they badly needed was load. The life of a public supply authority depended on a mixed load, and they must have the colliery and works business as well as that of the smaller consumers in the towns. If the collieries and works would buy only at the rock-bottom price they would make it very difficult for the public authority to take the supply to the towns. As they had seen, the station was very much underloaded, and he appealed to the members of the Association in their various spheres to do everything they could in this direction. A hearty vote of thanks was accorded to Mr. Beauchamp, and the directors and staff of the Power Company, on the proposition of the newly-elected branch president, Mr. T. S. Thomas, Bedwas.

Extensions at Maidstone.

At the official opening of the new extensions to the electricity works of the Maidstone Corporation on Wednesday last week, the Mayor of Maidstone, Mr. F. R. Connor, J.P., declared the extensions open, the chairman of the Electricity Committee, Councillor W. H. Martin, J.P., started the new 7,000-kW turbine up, and the Mayoress unveiled a tablet to commemorate the event. At a celebration luncheon, held afterwards, Councillor Martin, in reply to a toast, outlined the development of the electricity undertaking, which during its first 15 months of existence generated 326,000 kWh, and during the year ended March 31st last turned out 21¾ million kWh. In referring to the development of electricity supply generally, he said that youth must be impressed with the electrical idea. He understood that there would soon be a branch of the Electrical Association for Women in Maidstone. He paid a tribute to Mr. E. E. Hoadley, M.I.E.E., engineer and manager, for the efficient way in which the undertaking was run, and also to Mr. D. McBean, who had acted as constructional engineer for the extensions. Mr. Hoadley paid a very fine tribute to his staff, and said that the prevailing idea throughout the members was team work. The Corporation acted as a board of directors in the control of the undertaking. It was due to the results already obtained by the undertaking that the extensions had been authorised.

His Worship the Mayor, in proposing "The Visitors," urged the necessity of improving the efficiency of electricity generation as a means of cheapening the processes of production generally.

Col. W. K. Wigham, member of the Central Electricity Board, said that the courage and energy with which the use of electricity in industry had been pushed was remarkable. Referring to Mr. Hoadley's remarks about team work, he said that the whole idea of the Electricity Act was team work, and he looked on Mr. Hoadley as one of the most optimistic members of the team.

Mr. J. Andrew Lee, in supporting Col. Wigham, announced that he had transferred his services from the staff of the Electricity Commission to that of the Central Electricity Board. He had been requested by Sir J. Snell and his fellow Commissioners to voice their regrets at being absent from the ceremony.

Electrical Association for Women.

An exhibition for promoting interest in electric cooking and water heating was held at Whitstable from June 25th to June 30th. The opening ceremony was performed by Alderman Mrs. Hammer, and afterwards Miss Bisset, of the Jackson Electric Stove Co., gave a demonstration of the electric cooking of pastry, cakes, and bread.

On June 27th and 28th parties of London members visited Mrs. Godwin's light clinic at Ellerker Gardens, Richmond. Mrs. Godwin, who is a founder member of the E.A.W., explained the various lamps, and many questions were asked by the members.

On June 29th members of the Birmingham and Midlands Branch visited the Co-operative Bakery, Birmingham, where they saw dough bixed and cut, rolled and put into ovens, by means of electricity.

Nearly forty members took advantage of Mr. W. A. Turnbull's invitation to visit the Trades Exhibition at Aylesbury on July 3rd. The British Electrical Development Association provided motor coaches, and the party was met by Mr. Turnbull at Terrick, where some of the members were able to see some small cottages with electric light and cooking equipment. Much interest was also shown in the "Aylesbury" poles at Weston Turville. A tour round the exhibition, and tea, at which the members were the guests of Mr. Turnbull, were followed by a meeting in which the local women's institutes also took part. Lady Stopford, the Mayoress, gave the E.A.W. a charming welcome, and the Rev. Bruce Dixon, who in his boyhood had attended lectures by Michael Faraday, spoke a few words on his recollections of Faraday. Alderman Mrs. Hammer then gave a short lecture on "Electricity in the Home," and votes of thanks were proposed by Mrs. Ll. B. Atkinson and Mrs. Leach.

On the way back to London members had an opportunity of visiting Mr. Lief's nature cure health home at Champneys, where all the cooking and subsidiary heating is done by electricity.

On Saturday, July 7th, some London members joined the Ashford District Branch of the E.A.W. in their visit to Mr. Matthews's all-electric farm.

The last of the social afternoons for this session was held in the club room, 46, Kensington Court, on June 21st. This was well attended by members and their friends.

New York Edison East River Station.

Several features of the East River electricity generating station of the New York Edison Company, extensions to which are now being completed, are of considerable interest. The company has been greatly handicapped by the limited area available for the reconstruction of the plant, and owing to the narrow piece of property on which it stands at right angles to the river it has been necessary to run the condensing water pipes back from the river more than 1,000 feet. On account of space limitations it has also been necessary to get from three to five times the capacity per square foot of ground area that is used in other great stations. When the station is finally completed and all the circulating pumps are working at full load together, the total capacity will be 1,400,000 gallons of water per minute. To provide the necessary capacity in the limited space, the manufacturers were compelled to design their equipment for very large capacity in a condensed form, for example, a turbo-generator set, which is an additional installation now about to be erected, will develop 160,000 kilowatts on one shaft and one generator. The original plan of the station allowed for 500,000 kW capacity, but later developments have necessitated a capacity of 1,300,000 kW with the same size boiler-house as that originally planned. This concentration and saving in cost is due to the use of the water-wall type of boiler. Mr. T. E. Murray, vice-president of the New York Edison Company, points out that it has allowed of the elimination of refractory material exposed to high temperature in the furnaces. In New York there would be no justification at the present time for adopting high steam pressure, owing to the load factor conditions, which would result in higher fixed charges per kWh than the saving would justify; the increased efficiency would not be commensurate with the increased cost.

Fatalities.

While fitting an electric lamp in a holder at the works of Messrs. Brough, Liverpool, on July 5th, Henry Grice, aged 16, received a fatal electric shock.

Edith French, 6, Durrel Street, Blackfriars, was killed on June 7th, on the Southern Railway line at Oxshott Woods when she came in contact with the live rail. Two boys saw the girl on the track and signalled to the driver to stop. The train was brought to a standstill, but the girl had stepped on to the live rail and could only be removed by means of an insulated hook brought by the motorman from the train.

Educational.

NORTHAMPTON POLYTECHNIC INSTITUTE.—Session 1928-29. An examination will be held at the Polytechnic on July 18th and 19th for three scholarships in engineering and one scholarship in ophthalmic optics, each valued £18 per annum. An entrance examination for admission to the day courses in engineering and optics will be held at the Polytechnic on Wednesday, July 18th. (See our advertisement pages to-day.)

ROYAL TECHNICAL COLLEGE, GLASGOW, DEPARTMENT OF ENGINEERING.—The 1928-29 Session commences on Tuesday, September 25th. The calendar, by post 3s., and the prospectus *gratis*, can be obtained on application to the Director.

Stockholm Congress of Radiology.

The second International Congress of Radiology is to be held during July at Stockholm, and there seems to be little doubt that a very important gathering of X-ray workers from all parts of the world will meet on the occasion in question, for the purpose of discussing many aspects of radiological work. In conjunction with the Congress an exhibition of apparatus is being held in the Parliament House at Stockholm, and an important feature will be an exhibit of British-made X-ray apparatus, which is being contributed by the leading firms in this industry. Considerable importance is attached to this exhibit, inasmuch as it is the first occasion on which it has been possible for British manufacturers to show their products on a large scale at such a congress outside Great Britain. The X-ray apparatus industry is one of those which up to 1914 was mainly in the hands of other countries. Since that time it has become established in England, and the present occasion indicates its steady growth; it is hoped that at no distant date Great Britain and the Empire will be self-supporting in this important branch of scientific apparatus manufacture.

The Consulting Engineers' Congress.

At the International Congress of Consulting Engineers which is to be held at Amsterdam on September 12th to 15th (see Vol. CII, p. 1099), the questions to be discussed will include the intervention of public authorities and administrations instead of consulting engineers; the relations between consulting engineers, architects, and contractors, particularly in questions of central heating plants; the professional interests of consulting engineers; and standard specifications for different countries.

Rooms will be booked in hotels by the Dutch Committee, and receptions, sightseeing visits, &c., will be organised. Full information can be obtained from the secretary to the Organisation Committee, Mr. V. W. van Gogh, 125, Heerengracht, Amsterdam.

Ten Continental nations are now represented in the International Federation, of which Mr. L. Prangey is the president, Mr. R. E. Mathot being chairman of the managing committee, and Mr. V. A. Verhey, junr., of the Dutch Committee of Organisation.

A Dutch Experimental Electrical Laboratory.

A recent issue of *Elektrotechnik* contains a description of the central electrical laboratory which was opened in Arnhem, Holland, at the end of 1926 by the Association of Dutch Electricity Supply Undertakings. The laboratory is intended for the testing of lighting installation material, safety and automatic devices, switches, domestic electrical appliances, and so on. Both a.c. and d.c. supplies are available, while departments are also provided for the testing of electricity meters, h.p. insulation material, transformers, and so on.

Institution Notes.

Institution of Electrical Engineers.

ASSOCIATE MEMBERSHIP EXAMINATION.—As the result of the examinations held in May, 70 candidates passed or completed the whole examination; 18 passed Part I only, and 7 Part II only.

STUDENTS' PREMIUMS.—The Council of the Institution has made the following awards of Students' Premiums for papers read before the Students' Sections during the 1927-28 session:—

PREMIUMS OF THE VALUE OF £10 EACH:

To Mr. J. T. Allan, B.Sc., for his paper on "The Education of the Engineer"; to Dr. R. C. FOX, for his paper on "The Three-electrode Carbon Arc"; to Mr. C. J. O. Garrard, for his paper on "Phase-Advancing"; to Mr. J. W. Gibson, B.Eng., for his paper on "Control Equipment for Direct-current Trains"; and to Mr. E. A. Loban, for his paper on "The Economical Transmission of Electric Power."

PREMIUMS OF THE VALUE OF £5 EACH:

To Mr. L. Burdes, for his paper on "Electric Lifts," and to Mr. J. A. H. Lloyd, for his paper on "Carrier Telephone Systems."

Institute of Metals.

The Council of the Institute of Metals has accepted an invitation from the Verein deutsche Ingenieure and the Deutsche Gesellschaft für Metallkunde to hold next year's autumn meeting of the Institute at Düsseldorf. The meeting is expected to prove very attractive not only to British members, but also to members resident in Continental countries, who number many hundreds; it will be supported by powerful German technical societies and by a large German membership.

Our Personal Column.

Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements.

When the minutes of the Corporation Electricity Committee came before the Glasgow Town Council on July 5th a magistrate asked if the Town Clerk could tell them if there had been any word from Mr. HERBERT BELL, Hull, as to whether or not he accepted the managership of the Department. The Lord Provost pointed out that the matter was not contained in the minutes. The magistrate persisted—"Why is there all this delay in the man accepting the position?" The Lord Provost—"That is not in order"; to which the magistrate retorted, amid laughter—"There is nothing in order in that department at all."

Mr. S. W. ELLIS, who for the past 17 years has been in business in the electrical trade in Adelaide, South Australia, has arrived in London for a brief visit. Address, c/o English, Scottish and Australian Bank, London.

The Worksop Urban District Council has appointed Mr. S. MASON, Buxton, as electrical engineer, with a commencing salary of £400 per annum.

The London County Council General Purposes Committee recommends that in recognition of special services rendered during the past few years in connection with the reorganisation of the Council's tramway undertaking, grants of £2,000 and £500 be made to Mr. J. K. BRUCE, the general manager, and Mr. F. W. MACKINNEY, chief officer of supplies, respectively.

MRS. EVA MORRIS-AIREY has been granted a Civil List pension of £100 per annum in recognition of the services of her husband, the late Mr. H. Morris-Airey, in furthering the cause of science and the development of wireless telegraphy.

The Liverpool City Council last week decided to increase the salary of Mr. P. PRIESTLY, general manager of the Corporation tramways, from £1,600 to £1,800 per annum.

Bermondsey B.C. Electricity Committee has arranged to superannuate Mr. W. B. SMITH, engineer-in-charge, on the ground of ill-health.

Mr. C. CROFTON-SLEIGH was recently presented with a pewter tea service by the staff of the Sunderland Corporation electricity works on his leaving Sunderland to take up a position at the Norwich Corporation's Thorpe power station.

The marriage took place, on June 23rd, at Evenley, of Mr. THOMAS J. F. OLDHAM, A.M.I.E.E., and Miss M. KIDWELL, of Evenley, Northants.

Mr. HOWELL DAVID, traffic superintendent of the Cardiff Corporation tramways, is retiring after 41 years' service.

Obituary.—SIR DAVID YULE, BART.—The death occurred at his residence at St. Albans on July 3rd, of Sir David Yule, Bart., of the firm of Yule, Catton & Co., Calcutta, at the age of 69. Sir David, in addition to his other interests, was a director of many companies, including Electric Holdings, Ltd., the Metropolitan-Vickers Electrical Co., Ltd., and Vickers, Ltd.

Wills.—The late Mr. ERNEST HATTON, who was connected with electric tramway work for more than 30 years, being for 21 years general manager of the Newcastle-upon-Tyne tramways, left £11,854 gross (£8,061 net personalty).

The late Mr. LEE MURRAY, M.Inst.C.E., of Melbourne and London left £4,888 gross and £2,285 net personalty.

Financial Section.

New Companies, Returns of Share Capital, Debenture Changes, Reports of Electrical Companies, Dividend Results, Transactions in Stocks and Shares.

New Companies Registered.

Epoch Radio Manufacturing Co., Ltd.—Private company. Registered July 4th. Capital, £500 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in wireless, telegraphic and telephonic apparatus, valves, loud speakers, instruments, &c. The first directors (to number not fewer than two or more than seven) are:—T. M. Laserson, 85, Lonsdale Avenue, Wembley, engineer; Mrs. F. B. Laserson, 85, Lonsdale Avenue, Wembley. Qualification, 20 shares. Remuneration, £100 per annum. Solicitors: Satchell, Chapple and Son, 167, Regent Street, W.1. Registered office: 53, Gracechurch Street, E.C.3.

Triotone, Ltd.—Private company. Registered July 3rd. Capital, £5,250, in 5,000 "A" shares of £1 each and 5,000 "B" shares of 1s. each. Objects: To carry on the business of manufacturers of and dealers in Triotone gramophone radio instruments, portable gramophone radio sets, proprietary gramophone and self-contained radio sets and appliances and devices for recording, reproducing, transmitting, broadcasting and amplifying sound, including gramophones, records, amplifiers, loud speakers, musical instruments, valves, electrical appliances, manufacturers of and dealers in wireless apparatus, &c. The subscribers (each with one "A" share) are:—M. Hieger, 42, Chatsworth Road, N.W.2, advertising contractor; P. H. Goodwin, "Pagoda View," Taylor Avenue, Kew Gardens, accountant. The first directors (to number not more than five) are to be appointed by the subscribers. One of the directors so appointed shall be M. Hieger, who shall be permanent. Qualification, 500 shares. Remuneration, as fixed by the company. Solicitors: Kenneth Frown, Baker, Baker, Lennox House, Norfolk Street, Strand, W.C.2.

Viozone, Ltd.—Private company. Registered July 3rd. Capital, £2,000 in £1 shares (1,000 8 per cent. non-cumulative preference and 1,000 ordinary). Objects: To carry on the business of electrical engineers, general merchants, manufacturers of and dealers in electrical goods, &c. The life directors are:—E. Siegrist, Hilltop, Royal Circus, S.E.27, merchant; M. Z. de Ferranti, 29, Gloucester Gardens, W.2, merchant; C. L'Estrange Ewen, 106, Southampton Row, W.C.1, merchant. Secretary: C. L. Ewen.

Berry's Electric (1928), Ltd.—Public company. Registered July 9th. Capital, £225,000 in 10s. shares. Objects: To acquire the whole of the assets and undertaking of Berry's Electric, Ltd., and to carry on the business of electrical and general engineers, manufacturers and sellers of machinery, &c. The directors are:—H. H. Berry, G.2, The Albany, Piccadilly, W., electrical engineer; P. D. Morton, Heath Cottage, Nork Way, Banstead, Surrey; W. J. Markham, 111, Bournville Lane, Birmingham, electrical engineer; A. Skelton, Kilbirnie, Gilbert Road, Hale, electrical engineer; G. J. Berry, G.2, The Albany, Piccadilly, W., electrical engineer. H. H. Berry shall be permanent director and chairman so long as he holds £70,000 shares. Qualification of directors, £100 shares. Remuneration, £1,000 per annum, divided between them. Registered office: 86, Newman Street, W.1.

Showler, Ltd.—Private company. Registered July 2nd. Capital, £750 in £1 shares (250 7 per cent. cumulative preference and 500 ordinary). Objects: To carry on business as radio, electrical, television, gramophone and cycle engineers, manufacturers, contractors, retailers and dealers, &c. The subscribers (each with one share) are:—Miss M. Philpot, 4, Commercial Road, Tunbridge Wells; T. H. Showler, 4, Commercial Road, Tunbridge Wells, radio engineer; F. R. Dorvill, 27, Apsley Street, Tunbridge Wells, radio engineer. The first directors are Miss M. Philpot and T. H. Showler. Secretary: Miss M. Philpot.

A. Bodkin & Co., Ltd.—Private company. Registered June 29th. Capital, £3,000 in £1 shares. Objects: To acquire the business carried on by A. Bodkin at 3, Connaught Road, Eastbourne, and elsewhere, and to carry on the business of manufacturers and repairers of electric storage batteries, electrical equipment as applied to motor-cars, accumulator-charging apparatus, and electrical appliances generally, &c. The directors are: A. Bodkin, 69, Pevensey Road, Eastbourne; A. S. Edwards, Bolton Hotel, Burlington Place, Eastbourne. Qualification: £100 shares. Secretary: A. S. Edwards. Registered office: 20a, Cornfield Road, Eastbourne.

Official Returns of Electrical Companies.

Park Royal Engineering Co., Ltd.—Capital, £50,000 in £1 shares. Return dated April 5th, 1928. 37,605 shares taken up. £36,605 paid, £1,000 considered as paid. Mortgages and charges, nil.

Rowland Edwards & Co., Ltd.—Capital, £2,050 in 2,000 preference shares of £1 each and 1,000 founders' shares of 1s. each. Return dated May 29th, 1928. All shares taken up. £900 paid. £1,150 considered as paid. Mortgages and charges at date of return: £600. Since registered: Debenture dated June 12th, 1928, to secure £500.

Wadebridge and District Electric Supply Co., Ltd.—Capital, £3,450 in 1,250 preference and 2,200 ordinary shares of £1 each. Return dated May 12th, 1928. All shares taken up. £460 paid on 360 preference and 100 ordinary shares, £2,990 considered as paid on the remainder. Mortgages and charges: £850.

Electric Supply Corporation, Ltd.—Capital, £500,000 in 250,000 preference and 250,000 ordinary shares of £1 each. Return dated June 14th, 1928. All shares taken up. £479,000 paid on 250,000 preference and 229,000 ordinary shares, £21,000 considered as paid on 21,000 ordinary shares. Mortgages and charges, nil.

Northleach Electric Supply Co., Ltd.—Capital, £3,000 in £1 shares. Return dated April 17th, 1928. 1,650 shares taken up. £1,700 paid (including £50 paid on 100 forfeited shares). Mortgages and charges, nil.

Portable Wireless, Ltd.—Deposit on June 15th, 1928, of deeds of leases of properties in Bromley and Southsea, to secure all moneys due or to become due from the company to Barclay's Bank, Ltd.

Johnson & Turner, Ltd.—Satisfaction in full on May 31st, 1928, of two debentures dated June 28th, 1923, securing £100 each.

Cryselco, Ltd.—Satisfaction in full on November 2nd, 1927, of charge in respect of a guarantee dated June 2nd, 1924, securing all moneys and losses for which debenture holders may have become liable thereunder, but not exceeding £10,000. (Notice filed June 28th, 1928.)

H. Lewis, Ltd.—W. F. Whiting, F.C.A., Bridge Buildings, Nene Quay, Wisbech, was appointed receiver and manager on June 2'st, 1928, under powers contained in instrument dated January 22nd, 1927.

Leeds Flint Glass Co., Ltd.—Debenture dated June 22nd, 1928, to secure £1,500, charged on land at Leeds and the company's undertaking and property, present and future, including uncalled capital. Holders: Branch Nominees, Ltd., 15, Bishopsgate, E.C.2.

Hungerford and District Electricity Supply Co., Ltd.—Satisfaction in full on June 26th, 1928, of debentures dated August 17th and November 25th, 1927, and March 21st, 1928, securing £1,550.

Westinghouse Brake and Saxby Signal Co., Ltd.—Satisfaction in full on June 20th, 1928, of first mortgage debentures secured by trust deed dated March 2nd, 1921, securing £350,000.

Norton Wireless Co., Ltd.—B. Nichols, of 15, Baalbec Road, Highbury, N.5, ceased to act as receiver or manager on May 15th, 1928.

Radio Accessories, Ltd.—E. Maloney, of 11, Ironmonger Lane, E.C.2, ceased to act as receiver or manager on June 21st, 1928.

J. B. Saunders (1923), Ltd.—Capital, £5,000 in 1,000 preference and 4,000 ordinary shares of £1 each. Return dated May 7th, 1928. 795 preference and 4,000 ordinary shares taken up. £4,795 paid. Mortgages and charges nil.

C.C.A. (Central Cables and Accessories), Ltd.—Capital, £3,000 in £1 shares. Return dated April 25th, 1928. All shares taken up. £3,000 paid. Mortgages and charges nil.

C. J. Ferguson & Sons, Ltd.—Capital, £5,000 in 2,500 cumulative preference and 2,500 ordinary shares of £1 each. Return dated June 4th, 1928. 2,500 preference and 1,802 ordinary shares taken up. £2,802 paid on 1,802 ordinary and 1,000 preference shares. £1,500 considered as paid on 1,500 preference shares. Mortgages and charges nil.

J. P. Hall & Co., Ltd.—Capital, £35,000 in £1 shares. Return dated February 23rd, 1928. All shares taken up. £35,000 paid. Mortgages and charges nil.

Symondsbury Electric Lighting Co., Ltd. — Capital, £2,000 in £5 shares. Return dated April 26th, 1928. 244 shares taken up. £1,220 paid. Mortgages and charges nil.

West London and Provincial Electric and General Trust, Ltd.—Capital, £300,000 in 180,000 ordinary and 120,000 preference stock. Return dated May 14th, 1928. All stock issued and fully paid up. Mortgages and charges nil.

City Notes.

General Electric Co., Ltd.

The annual general meeting was held on July 3rd, Sir Hugo Hirst, Bt. (chairman), presiding. In moving the adoption of the report (ELEC. REV., June 29th, p. 1145), the chairman referred to the increasing of the dividend from 7½ to 10 per cent., and said that about ten or twelve days before they declared the dividend the shares rose three or four points. That rise was not due to any privileged information leaking out from the office, but to American buying. The company was one, amongst others, that had been selected by an American bank for the purpose of dealing in shares in America. Without their knowledge, these shares had been introduced not on the New York Stock Exchange, but on what was called the "Kerb." In the ordinary way, it did not much interest the board who might be shareholders in the company, but he believed that this was a matter which required watching. They believed that their company held a leading position in the British electrical industry, and it might cause great embarrassment some day if it were found out that too big a proportion of shares were held in non-British hands. It might be necessary to introduce measures to keep that movement in check within certain proportions so that the control should remain with British shareholders. The actual increase of profits over last year did not, at first sight, seem to justify the increased dividend, but they promised two years ago that whenever they saw something looking like stability in earning capacity they would feel it their duty to consider the ordinary shareholders. The latter had had to wait until depreciation, and reserves had been built up commensurate with the present capitalisation, so as to give them the strong position which they enjoyed to-day. The coal mining industry had not yet sufficiently recovered to be able to indulge in the capital expenditure which the electrical industry had long been anticipating, and was essential if the mines were to return to eventual prosperity. The iron and steel industry was so dependent on coal, and its recovery from the paralysis which it suffered through the coal strike had been so slow, that there again there had been no expenditure on new plant. The railway companies, too, were forced to restrict capital expenditure, and the textile industries had been anything but happy The only real improvement that could be recorded was in the shipbuilding industry, but even there, in spite of increased tonnage being put down, the electrical industry had not yet benefited, but they hoped in the future to reap the benefits of this improvement. But in spite of sluggishness in the important heavy industries, the company had been able to do an increased business and to make good the drop in prices and the loss of business in certain essential departments. The advance which had been made was mainly due to the slow but definite improvement noticeable during the last six months of the year under review, and present conditions seemed to indicate that that improvement would continue. He had a feeling that the existing peace in industry would have a real chance for the next few years, in spite of the endeavours of a few extremists to wreck it. The electrical industry itself was, as ever, full of promise. The working of the Electricity Act was progressing satisfactorily, but had, as yet, not influenced their accounts. He had always maintained that it would take some four or five years before that Act made its imprint on their balance sheet, yet it had helped to educate the general public in the greater use of electricity. A variety of new demands had been created, and gradual reductions in the price of electricity throughout the country had encouraged a demand for appliances. Increased production of appliances cheapened the price, and should thus prove a distinct aid to the expansion of their export business. With Russia and China at present out of the picture, with Brazil, Mexico, and the other South American states coming increasingly under American economic domination, they were more and more dependent on the Empire market. More than 20 per cent. of their total output went overseas during the last year, but their desire to expand and increase was not only dependent on cheap production, on the study and application of their apparatus at home and abroad, but it was always bound up with the prestige of the company from a technical point of view. New problems were constantly arising: a constant change was taking place, and years of research and experiment were often required before practical results were obtained, as the following would explain. For years they had given attention to the equipment of ships, and during the last year the *Bermuda*, a liner built in the yards of Workman, Clark & Co., was electrically equipped throughout with apparatus of G.E.C. manufacture. They had previously already equipped a ship for the Admiralty, and they were looking forward to great progress in this direction. During the past year they had obtained from the Underground Railway an order for 920 traction motors and control equipment for 63 motor coaches and 107 tractor cars. This was one of the biggest orders ever placed in this country for this class of work, amounting to three-quarters of a million. They had a contract for the new power station at Birmingham for over half a million, which included two 30,000-kW turbo-alternators, in addition to all the switchgear, transformers and motor generators. The development of bakelite accessories produced at their Witton insulation works had brought fresh life into their accessories business—the oldest department of the company. Great attention had been given during the past year to the development of industrial electric heating in bakers' ovens, japanning ovens, and annealing ovens —every one a problem of its own. Equally so, household appliances of every description had been developed, and they had particularly studied during the last year the weaknesses of all the existing refrigeration plants, and hoped to enter that market on safe ground with all the experience which they had collected. They had also designed many important illumination schemes. The co-ordination of the electricity supply of the country through the Electricity Commissioners' schemes of overhead transmission had found them prepared—but it had brought into the realm of ordinary engineering in the home country problems in very high-voltage technique which they had up to now only met in connection with installations abroad. The high-voltage testing plant for transmission equipment and control gear which they had in course of installation was planned for a million volts, and would suffice to meet everything that could be anticipated in the direction of further increase of voltages for several years to come. In conjunction with the engineers of the Marconi Company, they had been improving in size and reliability the large transmitting and rectifying valves. In the sphere of electromedical and similar equipment, demands had come and had been met for valves of greatly increased voltages. In telephones the main feature had been the production and supply of automatic installations, but they had also handled some of the transmission problems in long-distance loaded telephone cables. In the supply of electric power they dealt with currents of thousands of amperes and voltages of a hundred thousand and more—but no less important was the sphere of engineering which had to utilise currents down to a hundred-thousandth or a millionth of an ampere. The photo-electric cell, with its minute currents, was surely, before long, to be a common engineering device in television, talking films, and all purposes connected with the reproduction and transmission of pictures. In that sphere, too, they had, in their past researches, sown the seeds from which they hoped to reap a practical harvest. They were spending yearly some hundred thousand pounds to keep abreast of the times and to keep the company's reputation on a high level. It was probably due to the status of the company that, as chairman, he had been invited to be a member of a mission that was shortly proceeding to Australia with a view to studying—in conjunction with Australian experts—not only how to improve the business relations between two of the most important parts of the Empire, but also how to increase the productivity and prosperity of each, without detriment to the other. He had no fear in absenting himself for five or six months. During the whole of forty years it had ever been his object to delegate to others, and keep himself free for new ideas and new ventures. For 36 years Mr. M. J. Railing had been his *alter ego*, and the duties of managing director would fall on him. He would be assisted by colleagues every one of whom had worked in close personal touch with him and was a master of his particular art or department or works. Each had trained men younger than himself who were fully qualified to put their hand to the tiller should necessity arise. The report and accounts were adopted.

Anglo-Argentine Tramways Co., Ltd.

This company's report was dealt with in our issue of June 29th (p. 1145). The annual meeting was held on July 3rd, when Sir George A. Touche, Bt. (chairman), who presided, referred to the conditions under which the company catered for the 2,000,000 inhabitants of Buenos Aires. He said there was extreme congestion so far as the central zone of the city was concerned. There was omnibus competition, and the restricted fare, from the proceeds of which heavy taxation and paving charges had to be met. The annual liability for those two items alone amounted to well over £500,000. The only lasting remedy to relieve congestion was the extension of means for underground travel and the raising of certain surface tracks. Large tracts of land had been purchased by the company on the River Riachuelo, where workshops, warehouses and depôts were being erected. The new workshops would be capable of dealing with 50 per cent. more than the present rolling stock. Referring to the comparative merits of tramways and omnibuses, the chairman said that, generally speaking, the traffic returns in any of the big cities of the world to-day proved the case for the trams, and assisted towards a proper realisation of the indispensability of those vehicles to the modern transport requirements of large communities.

In Buenos Aires the public still showed a preference for the tramcars over other public vehicles. The report and accounts were adopted.

Dubilier Condenser Co. (1925), Ltd.

Sir Arthur Lowes Dickinson (chairman) presided at the annual meeting on July 3rd, and said that the report (ELEC. REV., June 29th, p. 1147) showed an improvement in business, although it still fell considerably short of the company's full working capacity. Although the heavy industries were still in a critical condition, the electrical and radio industries had shown substantial progress, with a prospect of its continuance during the current year. The company had to face competition from low-priced products purporting to be as good as their own, but they resolutely refused to lower the quality of their goods in order to reduce the price. They were certain that that policy would lead to increased business. The financial position of the company was strong; the directors considered it wise to hold sufficient liquid resources to enable them to take up new inventions or activities should it seem desirable to do so. Mr. W. H. Goodman, in seconding the motion, said that conditions in the radio industry were now more settled than they had been for some time, but there was a good deal of unfair foreign competition. The company was preparing to put on the market a combined portable radio receiver and gramophone, and it was progressing satisfactorily with the construction of the "Pathfinder," which would shortly be in operation in various parts of the country.

Oliver Pell Control, Ltd.

The accounts for the fifteen months ended March 31st, 1928, show a net profit, after providing for income-tax and depreciation of £6,653, plus £5,846 brought forward. After meeting preference dividend (8 per cent.) £2,000, and paying 6¼ per cent. on the ordinary shares, subject to income-tax, £2,500 is put to reserve and £3,349 remains to be carried forward. The alteration in the date of the balance sheet (making it for 15 months this time) was to enable the accounting period to coincide with that of allied companies (Radio Instruments, Ltd., R.I. & Varley, Ltd., and Tok Switches, Ltd.). The profit figure of £6,653 compares with £1,521 for the previous twelve months. A considerable improvement occurred during the last nine months of the fifteen, the turnover being £74,248, as against only £31,042 for the first six. The improvement has been generally maintained since the end of March, the turnover being nearly 40 per cent. up for April-June, as compared with the corresponding period of last year. The directors have entered into an agreement with a well-known manufacturer of electrical equipment which involved an investment of £9,752; a dividend thereon of £501 is included in the present accounts, but since the date of the accounts £3,900 more has been credited, this, in effect, representing an additional profit for the period under review. Meeting: July 17th.

Greenwood & Batley, Ltd.

Col. O. C. Armstrong, D.S.O. (chairman), presided at the annual meeting on July 2nd, and in presenting the report and accounts (ELEC. REV., June 29th, p. 1146), said that many false prophets had proclaimed the advent of better times, but so far as he could see there had been no real improvement in the engineering industry. The placing of orders of any importance was sporadic and, speaking generally, trade was still bad. At present there were no signs which justified the expectation of that continuous and steady improvement necessary to fill the works and bring the company back to prosperity. The company had been fortunate in being able to maintain a favourable balance for several years and to pay steady dividends. The total of the liquid assets was sufficient to discharge more than ten times the amount of the current liabilities. In spite of bad trade the shareholders could justly congratulate themselves upon the strong and satisfactory position of the company.

Stock Exchange Notices.

Application has been made to the Committee to allow the following to be officially quoted:—

Marconi's Wireless Telegraph.—133,788 ordinary shares of £1 each, fully paid, Nos. 3,113,838 to 3,247,625.

Dealings in the following have been specially allowed by the Stock Exchange Committee under Rule 159:—

Anglo-Portuguese Telephone.—43,110 ordinary shares of £1 each, fully paid, Nos. 412,451 to 455,560.

Marconi's Wireless Telegraph.—133,788 ordinary shares of £1 each, fully paid, Nos. 3,113,838 to 3,247,625.

Postal Telegraph and Cable Corporation.—£791,485 5 per cent. collateral trust debenture stock and fractional scrip certificates; $1,112,841 5 per cent. collateral trust gold bonds and fractional scrip certificates.

La Plata Electric Tramways Co., Ltd.

The gross receipts for the year 1927 were £110 058, and the net receipts £31,463. After meeting debenture interest, &c., and adding £1,177 brought forward, the available balance is £26.641. Of this, £7,000 is placed to renewals fund; the year's dividend on the preference shares is paid, together with 1¼ per cent. on account of arrears; and £4,641 is carried forward. The net revenue was slightly lower than in 1926. The company has received a new concession from the Municipality of La Plata, which awaits formal sanction by the Provincial Government.

The Underground Group.

The companies constituting this group have declared their dividends for the half-year ended June 30th. In addition to the preference dividends the following are the rates of distribution on ordinary capital:—

Metropolitan District Railway Co.—Ordinary stock: 2 per cent. (the same).

London Electric Railway Co.—Consolidated ordinary stock: 2½ per cent. (against 2 per cent.).

City and South London Railway Co.—Consolidated ordinary stock: 2½ per cent. (against 2 per cent.).

Central London Railway Co.—Undivided ordinary stock: 2½ per cent. (against 2 per cent.); preferred ordinary stock: 2 per cent. (the same).

Underground Electric Railways Co. of London, Ltd.—Ordinary shares: 3 per cent. (against 2 per cent.).

Parkinson and W. & B. Cowan, Ltd.

On Monday last this company published, for information only, particulars of its constitution and objects. It has an authorised share capital of £1,000,000, of which £938,212 has been issued. The main business of the company was originally the manufacture of gas meters, and later of gas stoves and cookers. It has recently become the policy of the company to develop, through its subsidiary and associated companies, the electricity meter business, and it is stated that this has become an important and remunerative part of the company's business. The directors believe that this branch is capable of considerable further expansion. Among the concerns which the company controls are:—The Standard Meter Co., Ltd. (Canada), Measurement, Ltd., Domestic Electrification, Ltd., and the Electricity Meter Mfg. Co., Ltd.

Aron Electricity Meter, Ltd.

The net profit for the year ended March 31st last was £5,175, as compared with £9,041 for the preceding year. A balance of £2,376 brought forward is added, making £7,551. From this a dividend of 4 per cent. is being paid on the ordinary shares (against 6 per cent.), and £160 is carried forward.

Meetings were called for Wednesday last to consider proposals for a re-arrangement of the capital whereby the preference shares will eventually be paid off. It is proposed to exchange, in the first place, the preference shares for 6 per cent. income debenture stock with participating rights amounting to 25 per cent. of the surplus profits after the payment of fixed interest and 10 per cent. on the ordinary shares. The stock is to be redeemable at the company's option at £105 per cent. This, in effect, means the reduction of the company's share capital by £103,332, and after the reduction is sanctioned by the Court it is proposed to restore the nominal capital to its present level—£350,000.

New Issue.

National Sun Ray and Health Centres, Ltd.—This company has been formed to take over number of "sun-ray" treatment centres in various parts of the company and carry on ultra-violet radiation treatment with quartz mercury lamps. On Monday last the company offered for subscription 120,000 10 per cent. cumulative participating preference shares of 10s. each and 120,000 deferred shares of 1s. each at par.

Anchor Cable Co., Ltd.

The net profit for the past year was £62,498, and to this is added £95,588 brought forward, making £158,086. A final dividend of 10 per cent. is declared, making 15 per cent. for the year, against 10 per cent. for 1926. After transferring £15,000 to taxation reserve, £113,836 is carried forward.

Kalgoorlie Electric Tramways, Ltd.

The gross receipts for 1927 were £22,998 (against £23,661), and the net profits £4,300, against £4,223. The slackness in the mining industry was the cause of the decline in receipts, but the working expenses were reduced.

Power Investment Corporation, Ltd.

At the recent meeting of the company, the chairman (Mr. R. O. Hambro) said that during the past year the authorised capital had been raised from £1,000,000 to £1,500,000, while the issued capital had been increased to £1,000,000 since March 31st. The moneys thus raised had been invested and satisfactory results were expected.

Electric and General Investment Trust, Ltd.

The gross profit for the year ended May 31st was £10,692 (against £10.829). With the balance brought forward the amount available is £44,249. Of this, £7,467 is absorbed by debenture interest, preference dividend, and purchase of funding certificates, leaving £47,474 to be carried forward.

Broughton Copper Works, Ltd.

This company, which is a reconstruction of the Broughton Copper Co., Ltd., and incorporates John Bibby, Sons & Co. (Garston), Ltd., reports a trading profit of £66,348, which is slightly below the prospectus estimate. Of this, £62,650 has been paid to the vendor company in accordance with the agreement.

Dutch Company.

The *Philips Incandescent Lamp Works* is offering 4,427,000 guilders of ordinary shares at 250 and 1,758,000 guilders of preference shares at 130 to present shareholders in the proportion of one new for four old shares. The new shares will participate in the profits for 1928.

Bournemouth and Poole Electricity Supply Co., Ltd.

The directors have declared a dividend on the ordinary shares at the rate of 12 per cent. per annum for the half-year ended June 30th. Last year the rate was 9 per cent. per annum on half the capital.

Crompton Parkinson, Ltd.

A dividend at the rate of 6 per cent. per annum for the six months ended June 30th has been declared on the preferred ordinary shares, payable July 31st.

Smithfield Markets Electric Supply Co., Ltd.

An interim dividend of 3 per cent. has been declared on the ordinary shares, as last year.

Notting Hill Electric Lighting Co., Ltd.

An interim dividend of 5s. per share has been declared on the deferred shares, as last year.

Yorkshire Electric Power Co.

An interim dividend at the rate of 6 per cent. per annum has been declared on the ordinary shares.

Electrical Distribution of Yorkshire, Ltd.

An interim ordinary dividend at the rate of 9 per cent. per annum has been declared.

Richmond (Surrey) Electric Light and Power Co., Ltd.

An interim dividend at the rate of 8 per cent. per annum has been declared on the ordinary shares.

Chiswick Electric Supply Corporation, Ltd.

An interim ordinary dividend of 7½ per cent. has been declared, as in 1927.

French Companies.

The *Société de Constructions Electriques de France* states that as a result of the financial reorganisation the year 1927 was a period of transition. The works completed the delivery of a series of locomotives and had started the construction of 40 further locomotives ordered in June, 1927, the first of which has just been placed in service on the Trans-Pyrenean line. The development of turbines, &c., proceeded normally. Five 10,000-h.p. turbo-alternator sets were installed at the Miecbat works, and three of the same size at the Artouste works, both of which supply the Southern Railway. The credit balance of 129,000 fr. has been carried forward.

The *Compagnie Electro-Mécanique* reports a further improvement for last year. The steam turbine branch was very active, and one set of 35,000 kW, the third of the size, was delivered to the Compagnie Parisienne de Distribution d'Electricité. Hydro-electric alternators were supplied, both to the metallurgical and electricity supply industries. The sale of transformers and h.p. apparatus continued to develop, and several 120,000- to 160,000-V transforming stations were delivered, while the construction of ten electric goods locomotives, built in conjunction with the Compagnie Fives-Lille, will be completed this year. The accounts show net profits of 5,670,000 fr., and the dividend is 35 fr. (7 per cent.) per share.

The *Compagnie Française Thomson-Houston* states that the orders booked in 1927 were greater than those in the previous year, and there has been a further increase this year. During last year the home market for electrical machinery was rather restricted, and efforts were concentrated upon the development of export trade. The company participated with a group of banks and engineering companies in the creation of the Société d'Etude et de Construction de Centrales, which has already obtained an important order for a supply and tramway undertaking in Smyrna. In conjunction with the Société Alsacienne de Constructions Mécaniques it is proposed to form a joint subsidiary company to construct electrical and electro-mechanical plant. Including a balance of 12,326,000 fr. brought forward, the accounts show a net surplus of 30,209,000 fr., permitting of the payment of a dividend of 30 fr. per share.

Austrian Companies.

The *United Electricity Co.*, Vienna, reports an extension of activity in 1927. The net profits are returned at 1.88 million schillings as against 1.37 millions in the preceding year, and the dividend is raised from 8 to 9 per cent.

The *Austrian Siemens-Schuckert Co.* reports that larger orders were received in 1927 specially from the paper, textile and sugar industries, while ten further locomotives were ordered by the Federal Railways, to which 15 locomotives were supplied last year. Including the balance forward the accounts show net profits of 1.97 million schillings as compared with 1.87 millions in the previous year, and the dividend remains at 6 per cent. Four further locomotives have been ordered this year by the Federal Railways, together with two 30,000-kVA generators for the Vernunt works, which will be the largest made in Austria.

Stocks and Shares.

MONDAY EVENING.

The Late Mr. Loewenstein.

STOCK Exchange markets suffered a sharp shock by the news of the death of Mr. Alfred Loewenstein, the Belgian financier, whose activities have been, during the present year, so particularly marked in the region of electrical and utility interests. In the shares of one of his companies—the Hydro-Electric—a violent gamble sprang up in the earlier part of the year, which led to the shares being hoisted from 40 to 86. This time last week the price stood at 52, and on Thursday last, when the news of Mr. Loewenstein's death became known, it dropped to 25, business being done as low as 20. On the issue of a statement from some of the late Mr. Loewenstein's colleagues, there was a recovery to 40. The market in other shares of this nature was sympathetically disorganised, but in the rally which ensued the greater part of the loss was reinstated, and, except in respect of Hydro-Electrics and International Holdings, the movements are not of any great consequence. From the references made in this column from time to time regarding the dead financier, it will have been gathered that some people regarded him as a genius, while others considered him to be a bold and somewhat rash speculator. The tragical manner of his disappearance threw into the greater prominence the Stock Exchange effect upon the prices of companies in which Mr. Loewenstein held interests, while the fear that financial troubles in Brussels would come to a head led to a temporary wave of depression in other parts of the House. The first shock lasted for no more than a day or two, but Stock Exchange business proceeded cautiously.

Cable Strength.

In bright contradistinction to the dullness which has settled over some of the markets, the renewed strength of the cable quartette stands out conspicuously. Eastern Telegraph ordinary, Eastern Extensions, Westerns and Globe Telegraphs are again higher on the week. Eastern ordinary followed up its rise of 26 points of last week with another jump of 7, and the shares of the other three companies followed on similar lines. Marconis, which were 67s. 6d. a week ago, dipped to 63s. before they recovered, Marconi Marine are ¼ higher at 49s. 3d. The Premier stated in the House of Commons that he understood the report of the Imperial Wireless and Cable Conference would be submitted shortly, and inspired statements appeared, immediately afterwards, which outlined the main points of that document.

A Communications Company.

The proposal is that a "Communications" Company shall be formed, on the same lines as the Port of London Authority, its direction including Cabinet Ministers, or at least two members nominated by the Government. The Communications Company will be operated by private enterprise, and the capital is in accordance with the expectation formed last March, namely, about 54 million pounds in three different classes of stocks: 5½ per cent. cumulative preference, 7½ per cent. non-cumulative "A" ordinary, and "B" ordinary. Of the 54 millions, it is suggested that rather less than one-third should go to Marconi's, and the cable companies should take the remainder. The Government insists upon various safeguards for the benefit of the public, and a proviso is that out of any profit exceeding the present level, 50 per cent. is to be applied either to reducing charges to the public, or in providing additional facilities. These proposals are in accordance with the hopes of the stockholders and others who wished for the control of the communication business to be handed over to private, instead of Government, hands. But the immediate effect on the Stock Exchange market was to bring about a reaction from the best prices touched by Eastern Telegraph ordinary and the shares of other companies in the group. This was due to the usual desire to take profits on the part of people who bought the stocks earlier, and whose anticipations are now, so far as preliminaries are concerned, realised by the semi-official pronouncements upon the report.

Canadian Marconis.

The radio market is good, as a whole, though the extremely mercurial movements of the leading issues place a check upon investment and speculative enterprise alike. Canadian Marconis have risen several shillings to 31s. The company has been granted licences by the Canadian Government for the establishment of a service between Montreal and New York. (It is further announced that beam telegraphy between Australia and England is likely to be established soon upon a commercial basis.)

The Canadian Marconi Company's report shows that the net profit for 1927 was $46,555, nearly double the net profit for 1926. The figures are small in themselves, but optimism looks for a powerful impetus to be given to their expansion through the developments which are taking place.

The issued capital of the Canadian Marconi Company, by the way, is 4½ million dollars. Buying of the shares has been mainly from America, whence also has proceeded a demand for Spanish Marconis, raising the price to 28s.

Tube Railway Dividends.

Interim dividends are now announced by the Underground Electric Railways of London, and its associated companies. Public interest, from the speculative point of view, has been directed principally to the dividend on the £1 shares of the first-named company, and these are to get 3 per cent., comparing with 2 per cent. for the corresponding period of 1927. For the whole of last year the shares received 5 per cent., and it is hoped that for the current twelve months the dividend will be raised to 8 per cent., although caution is prepared for a possible 7 per cent. in view of the companies' known conservative policy in the matter of distribution. The interim dividend on District ordinary is to be 2½ per cent. against 2 per cent. a year ago, and this suggests that for the twelve months the dividend will be either 4½ or 5 per cent. Increases of ½ per cent., to 2½ per cent. in each case on the ordinary stocks have been announced by the City and South London and Central London, while the London General Omnibus dividend of 3½ per cent., tax free, and the Associated Equipment's 4 per cent., tax free, are at the same rates as those declared a year ago. The Metropolitan dividend comes on July 26th. Prices in the market for Tube stocks are lower, though less depressed than those of the steam railway stocks, where heavy falls occurred in consequence of the continued alarming decrease in traffic returns.

Provincial Electric Shares.

Bournemouth and Poole Electricity Supply Company has announced an interim dividend at the rate of 12 per cent. per annum on the ordinary shares, as against 9 per cent. a year ago. The Chiswick Electricity interim dividend is to be 7½ per cent., the same as before, and the Richmond Electric dividend at the rate of 6 per cent. is also unchanged. The market in electricity supply shares is steady, practically escaping any repercussion from the heaviness induced last week by the news of Captain Loewenstein's death. There remains a persistent demand for the shares of the provincial power and supply companies on behalf of investors who are attracted, not so much by the yield which the shares offer at the current rates of dividend, as by the expectation, several times mentioned here, that in course of time new issues will have to be made in order to provide further working capital, and that such shares will be offered at prices involving a bonus for the proprietors. The visit of members of the Central Electricity Board to Manchester served to attract interest to the companies serving the large industrial areas in the North. Talk revived of a possible taking-over of the Bournemouth and Poole Company by local authorities, and the price of the shares rose 2s. 6d., causing a sympathetic advance to 38s. 6d. in County of London ordinary.

New Issues.

Bermuda Traction 7 per cent. debenture stock, offered the other day at 100, was left with the underwriters to the extent of 72 per cent. The market in the stock had not been started when this was written, though it was expected that the opening price would be about 3 discount. Underwriters, who received 2½ per cent. commission, were also given a small proportion of shares, and they are not likely to be at any loss if they wish to dispose of their interests without delay. The new Scottish Power shares have strengthened to 3s. premium; the old recovered to 50s. The new Midland Counties stand at 4s. 9d. premium. Tokio Electric new scrip is 3 premium; Egham and Staines new shares are 37s.

Miscellaneous.

Manufacturing issues are quiet, with an improvement to 5½ in Henley's as one of the outstanding features. The meeting was considered very satisfactory, and, in spite of the extremely modest yield offered by the shares at the present figure, the prospect of favours to come serves to encourage steady investment in the shares. General Electrics are up to 40s.; Johnson & Phillips have gone back to that same price, and Crompton-Parkinson preference lost a few points at 17s. 6d. The London Traction group is dull, a fall of 2 points in London United Tramway debenture lowering the price to 60½. London & Suburban Traction preference change hands fairly freely on the basis of 9s. Amongst the Mexican utility issues, the Light & Power Company's stocks have moved irregularly; the 7 per cent. preferred at 80 are 1 up, while the second preference reacted to 2½. The death of Mr. Loewenstein caused the market in Mexican utility shares as a whole to become somewhat nominal for a few hours, but a reassuring statement, issued shortly after the tragedy, brought about a renewal of confidence that had suffered no more than a slight shaking. The Canadian industrial list is uninteresting. Brazilian Tractions have risen 3 dollars, after being flat, and the preferred at 190 have put on 5. It is said that American interests are again endeavouring to acquire Metropolitan Electric ordinary, although this may be no more than talk to explain the price advancing to 2 7/16. Engineering shares move within narrow limits, and the rubber share market gives no indication of vitality.

Share List of Electrical Companies.

	Nom. £	Dividend. 1926.	Dividend. 1927.	Price July 9, 1928.	Rise or fall.	Yield. p.c.
HOME ELECTRICITY COMPANIES.						
Bournemouth and Poole	1	14†	15	3	+½	... ...
Brompton Ordinary	1	8½	8½	26/6	—	5 5 8
Charing Cross Ordinary	1	8½	8½	27/-	—	5 5 8
do. do. 4½% Pref. ...	1	4½	4½	17/6	—	5 2 10
Chelsea	1	8½	8½	26/6	—	5 5 8
City of London	1	10	10	30/9	—	4 11 1
do. do. 6% Pref.	1	6	6	23/-	—	5 4 4
Clyde Valley	1	8	8	38/6	—	4 3 0
County of London	1	7½	7½	38/6	+2	3 18
do. do. 6% Pref.	1	6	6	23/-	—	5 4 4
Edmundsons' 7% Pref.	1	7	7	25/6	—	5 9 10
Elec. Supply Corporation	1	11	11	51/3	—	4 5 9
Kensington Ordinary	1	8	8	26/6	—	5 5 8
Lancs. Light and Power	1	7½	7½	29/-	—	5 3 5
London Electric	1	8½	8½	26/6	—	5 5 10
Metropolitan	1	8	9	2 7/16	+1/16	3 13 9
do. 4½% Pref. ... —	1	4½	4½	17/6xd	+3d.	5 2 10
Midland Counties	1	6	6½	30/-	—	4 6 8
Mid. Elec. Power	1	—	15	29/3	−9d.	... ...
Newcastle-on-Tyne Ordinary ...	1	5	6	26/3	—	4 11 5
do. 7% Pref. ...	1	7	7	26/6	—	5 5 8
Notting Hill 6% Pref.	10	6	6	10½	—	5 11 7
North Met. Elec. 6% Pref. ...	1	6	6	23/-	—	5 4 4
St. James' and Pall Mall	5	8	8	27/-	—	5 3 8
Scottish Power	1	8	8	30/-	+6d.	5 6 8
South London	1	8½	8½	26/6	—	5 5 8
Urban Ordinary	1	7	7	31/3	—	... ...
Westminster Ordinary	1	8½	8½	27/-	—	5 3 8
Whitehall Elec. Invst. 7½% Pref. ...	1	7½	7½	28/3	—	6 9 0
Yorkshire Elec. —	1	8	8	34/6	—	4 12 9
HOME RAILS.						
Central London Ord. Assented ...	Stock	4	4	73	—	5 9 7
Metropolitan	,,	8	8	68½	−1½	4 8 8
do. District	,,	8½	4	75½	−½	5 6 0
Underground Electric	£1	1½	5	28/6	−6d.	3 15 6
do. do. Income ...	Bonds	6	6	125	−3	4 16 0
TELEGRAPHS AND TELEPHONES.						
Anglo-Am. Tel. Pref.	Stock	6	6	101½	+1	5 18 5
do Def.	,,	1½	1½	24	−¼	6 5 0
Automatic Telephone	1	10	10	45/-	—	4 9 0
Eastern Extension	10	10	10	24½	+½	*4 1 0
Eastern Tel. Ord.	Stock	10	10	250	+7	*4 0 0
Globe Tel. and T. Ord.	10	10	10	24½	+½	*4 1 8
do. do. Pref.	10	6	6	11	—	5 9 1
Great Northern Tel.	10	20	20	39	—	5 2 7
Indo-European	25	10	10	44½	—	*5 12 4
Marconi	10/-	5	—	67/6	—	0 14 9
Marconi-Marine	1	8½	12½	49/-	+1/-	5 2 2
Oriental Telephone Ord.	1	12	12	53.9	—	*4 9 3
United R. Plate Tel.	5	8	8	11½	—	*3 12 0
Western Telegraph	10	10	10	24½	+½	4 1 8
HOME AND FOREIGN TRAMS, &c.						
Anglo-Arg. Trams First Pref. ...	5	5½	5½	3⅜	—	7 11 9
do. do. 2nd Pref. ...	5	6	6	8½	—	8 2 8
do. do. 5% Deb. ...	Stock	5	5	79½	+1	6 5 9
British Electric Traction Def. Ord.	,,	—	—	500	—	... ..
do. do. Pref. Ord.	,,	8	7½	124½	—	6 0 6
Brazil Traction	100	8	7	62½	+3	2 16 0
Brit. Columbia Elec. Rly. Pcs. ...	Stock	5	5	97½	−1	5 2 6
London & Sub. Trac. 5% Pref. ...	1	Nil	Nil	9/6	—	... ..
London United Tram Deb. ...	Stock	4	4	60½	−2	6 12 3
Mexico Trams, 5% Bonds	—	5	5	84½	−1	5 18 4
Mexican Light Common	100	Nil	Nil	75	—	... ..
do. 7% Pref...	100	Nil	7	80	+1	8 15 0
do. 1st Bonds	—	5	5	89½	—	6 1 3
Yorkshire (West Riding)	1	Nil	Nil	7/6	—	... ..
MANUFACTURING COMPANIES.						
Babcock & Wilcox	1	13	15	67/6	—	*4 9 0
British Aluminium Ord.	1	10	10	46/3	—	*4 6 7
British Elec. Transformer Pref. ...	1	7	7	18/-	—	*7 15 0
British Insulated Ord.	1	15	15	4⅜	—	3 12 6
Brush Ord.	1	10	10	28/9	—	6 19 F
Callenders	1	15	15	4⅜	—	3 10 6
do. 6½% Pref.	1	6½	6½	23/9	—	5 9 5
Crompton Parkinson Pref. Ord. ...	1	—	—	17 6	−6d.	... ..
do. 8% Pref.	1	—	8	26/3	—	6 2 0
Edison-Swan	£/-	10	10	12/6	—	3 4 0
do. 5% Deb.	Stock	5	5	88	—	5 13 8
Electric Construction	1	7½	7½	27/6	—	5 9 1
Enfield Cable Pref.	1	7½	7½	26/3	—	5 14 3
English Electric	1	Nil	Nil	8/-	—	... ..
do. do. Pref.	1	8	Nil	11/3	—	... ..
Gen. Elec. Pref.	1	6½	6½	24/6	—	5 6 1
do. Ord.	1	7½	10	2	+6d.	5 0 0
Henley	1	25	25	5½	+½	4 5 0
do. 4½% Pref.	5	4½	4½	4½	—	5 6 0
India-Rubber	1	Nil	Nil	15/-	—	... ..
Johnson & Phillips	1	12½	10	2	−½	5 0 0
Met.-Vickers Ord.	1	8	6	32/6	—	3 13 10
do. Pref.	2	8	8	2⅜	—	6 1 11
Siemens Ord.	1	7½	7½	27/6	—	5 9 1
Telegraph Construction	13	10	10	25½	—	*4 18 0

* Dividends paid free of Income Tax.

† 4% of which was Tax Free.

Recent Italian Developments.

Hydro-Electric and Telephone Progress.

MESSRS. E. C. D. Rawlins and H. C. A. Carpenter, respectively Commercial Counsellor and Commercial Secretary at the British Embassy, Rome, have furnished a report* to the Department of Overseas Trade upon the economic situation in Italy, dated April, 1928.

The authors, while deprecating undue optimism, are of the opinion that although certain difficulties exist in the economic and industrial spheres, there is good ground for hope that the upward trend and progress in Italy's economic and commercial life will be maintained and strengthened. The currency deflation during last year made conditions very difficult for industry, particularly the textile and engineering trades, but the decision to hold the exchange at about 90 lire to the pound sterling brought a certain measure of relief.

Recently new regulations governing the contraction of foreign loans have been put into force owing to the Government's fear that too great an influx of foreign capital had an element of danger. All applications for permission to raise foreign loans are now subject to severe scrutiny by a special committee headed by the Minister of Finance. It is seen from a list of loans raised abroad that the electrical industries occupied the first place—the total since 1925 being $80,000,000.

Foreign Trade.

The statistics of imports and exports for 1927 show an increase in the adverse balance from 939 million gold lire to 1,259 million. An appendix gives details of Italy's imports for the past three years. This indicates that Great Britain's share of the electrical trade is very small. For instance, during 1927 Italy imported 22,100 quintals of electric generators and motors (against 38,100 q. in 1926), and of this Great Britain provided only 700 q. (against 600 q. in 1926). Although Germany's share fell from 19,400 to 7,500 q., her share was still by far the largest. Hungary's quota declined from 5,000 q. to 2,000 q., while that of France rose from 1,900 q. to 3,400 q. The total imports of miscellaneous electrical apparatus rose from 15,000 q. in 1926 to 15,800 q. in 1927. At the same time, Great Britain's share increased from 200 q. to 1,000 q.; Germany's fell from 8,200 q. to 7,600 q.; and France's rose from 1,200 q. to 1,300 q. On reparations account there was imported during 1927 663 q. of electric wire and cables (against 520 q.) and 49 q. of electrical insulators (against 73 q.).

The copper and alloy market in general has been less active than in 1926, though the demand for copper brass of American origin for the manufacture of electrical wire has been steady owing to the continuous development of electrical and telephone plant in Italy. The demand for copper slabs from Chile for the production of copper sulphate also showed a slight increase. From the United Kingdom 33,469 quintals of ingots and scrap valued at 18,976,046 lire was imported in 1927, compared with 46,006 q. of a value of 35,172,679 lire in 1926.

A National Export Institute was founded in 1926, and upon his retirement from the position of president in June, 1927, Dr. Alberto Pirelli reviewed the year's work. In addition to the creation of an extensive information service, the Institute had been instrumental in obtaining the foundation of a company to insure export credits, and the guarantee of the Government to credits presenting special risks. A new organisation is the National Federation of Foreign Commerce to which all merchants engaged in export trade belong.

Railway Construction and Electrification.

An agreement was signed last year between Italy and the Republic of San Marino for the construction by the former of an electric railway connecting the Republic with the Adriatic at Rimini. Italy will operate the line for a period of 25 years, after which that part of the line within the Republic will pass into the latter's ownership.

The total length of track in Italy, on which electric traction is used, is 1,060 km., or an addition, during the period under review, of about 146 km., compared with 59 km. added in the previous year. The addition of electrified track during the year includes the section from Spezia to Leghorn (104 km.), and, with that already working from Modane to Spezia, this is the longest stretch of line operated electrically in Europe, being about 348 miles. The principal tracks which are at present being electrified are: Rome-Sulmona (172 km.), Foggia-Benevento (101 km.), and Bolzano-Brenner (89 km.). During the year plans have been prepared for the electrification of the following lines: Cuneo-San Dalmazzo, Savona-Ventimiglia, and Benevento-Naples.

Communications and Broadcasting.

There was a loss of 98.2 million lire on the telegraph system during the period under review, against 87.2 million lire in the preceding year, in spite of increased traffic and special methods adopted to attract business. On the other hand, the profit on the telephone services increased from 33.7 million lire to 44.3 million. The authorities have concluded a contract, amounting to 527 million lire, with a private company for the supply and laying of underground telephone cables between some of the principal towns. Underground telephone cables exist at present only between Milan, Turin and Genoa. The contract refers to the first part of a larger scheme which will be carried out when the requisite financial means are available. The transfer of the urban telephone lines to private enterprise has led to considerable improvements and developments. At the end of the year the telephone systems of Rome, Milan and Turin were reported to be entirely automatic.

Various legislative and administrative measures have been taken during the year in connection with radio-telegraphy and broadcasting. The principal of these provisions is the decree of September 3rd, 1926, relating to the operation of radio installations on board merchant vessels, for which a concession has been accorded to the Società Italiana Radio Marittima, formed by the Italian Marconi Co. and the Radio Italia. The concession, which is for a period of 20 years, does not constitute a monopoly, but concessions cannot be accorded to other than an Italian company, the majority of whose shares must be held by Italians. Several concessions have been granted for the erection and operation of directional radio-telephony stations.

With regard to broadcasting, a committee of control was set up by decree of January 27th, 1927. In addition to control the committee is charged with examining and reporting on the most suitable methods for the development and improvement of broadcasting. A decree dated December 13th, 1927, contains new broadcasting regulations whereby these services in Italy and her colonies are given in exclusive concession, for a period of 25 years, to the *Ente Italiano per le Audizioni Radiofoniche* (*E.I.A.R.*). The measure provides also for a reduction in the subscription rates and amends the taxes payable on receiving sets.

During the year under consideration the *Italcable* has completed the laying of two cables, Anzio-Barcelona and Barcelona-Malaga, thereby doubling the connection between Anzio and Malaga. The company, whose paid up capital amounts to 260 million lire, possesses cables between Anzio and Malaga, Malaga and Fayal in the Azores, and from Malaga *via* Las Palmas, St. Vincent, Fernando de Neronha, Rio de Janeiro and Montevideo to Buenos Aires.

Hydro-electric Development.

While the first power station in Italy was erected in Milan in 1883, producing 1,200 h.p., the present importance of the electrical power plant in the country is indicated by the amount of the capital invested in the hydro-electric companies. Investments in this branch of industry have steadily risen from 559 million lire in 1914 to 6,500 million lire at the end of June, 1927; and if the 80 million dollars, loaned mainly by the United States, is included, the capital now invested, converted into dollars, amounts to $580 million. It is estimated that a further thousand million dollars will be required to utilise all the available hydro-electric sources of the country. During the last seven years the consumption of electric power in Italy has doubled. In 1919-20, 312 million kWh was used for lighting and 3,384 million for other purposes, a total of 3 696 kWh. In 1925-26 the figures had risen to 672 and 6,688 million kWh respectively, a total of 7,360 million kWh. In 1926 the *per capita* consumption of electricity was estimated at 185 kWh per annum, a figure which can be largely increased when the works, at present under construction or planned for the electrification of central and, more particularly, southern Italy and the islands, are completed. Hydro-electric power stations which will increase the present annual production by 3,000 million kWh are under construction, and expected to be completed within the next four years. It has been estimated that by fully utilising the water power available in the Alps and the Apennines a total of about 26,000 million kWh of electric power could be generated annually.

To ensure full utilisation the hydro-electric power stations must be connected with a certain number of steam generating plants, some of which are already erected and others are planned; at present, it is estimated, that 79 per cent. of the power produced is obtained from water. The electrical industry includes twelve important companies, and this concentration in a few hands has favoured the development of h.p. lines by which the different systems are interconnected. There are already hundreds of miles of lines at 130-140 kilovolts already in operation, and a 220-kV line is now being laid between Bolzano and Cislago, a distance of 178 miles. Among the hydro-electric power stations, which commenced to function in 1927, was the first group of the Sila in Calabria, with 140,000 h.p. The reservoir of Coghinas in Sardinia, with a capacity of 342 million cubic metres, generating approximately 20,000 h.p., has also been opened.

* Stationery Office. 3s. 6d. net.

Indian Electrical Imports.

Figures for 1926-27 and 1927-28 Compared.

THE following are the figures of the electrical imports into India during the twelve months ended March 31st, 1928. In accordance with our usual practice the comparative figures for 1926-27 and the increase or decrease for each item is also shown :—

	1926-27. Thou. Rs.	1927-28. Thou. Rs.	Inc. or dec. Thou. Rs.
Electrical machinery—			
Control and switchgear	3,238	3,653	+ 415
Generators, alternators and dynamos	4,942	3,807	−1,135
Motors	2,935	3,536	+ 601
Transformers	2,304	1,162	−1,142
Turbo-generator sets	771	179	− 592
Other electrical machinery ...	8,744	7,669	−1,075
Total	22,934	20,005	−2,929
From United Kingdom	18,605	16,648	−1,957
,, Germany	1,095	931	− 164
,, United States	2,266	1,457	− 809
,, Other countries	968	970	+ 2
Electric fans and parts thereof—			
Total	3,187	3,390	+ 203
From United Kingdom	2,121	1,834	− 287
,, Italy	602	790	+ 188
,, United States	149	188	+ 39
Electric wires and cables, rubber insulated—			
Total	3,043	3,323	+ 280
From United Kingdom	2,839	3,125	+ 286
,, Germany	121	112	− 9
,, Netherlands	24	31	+ 7
,, United States	33	33	—
Insulations other than rubber—			
Total	2,908	3,546	+ 638
From United Kingdom	2,594	3,125	+ 531
Telegraph and telephone wires and cables—			
Total	97	72	− 25
From United Kingdom	84	57	− 27
Bare copper wire (electrolytic)—			
Total	2,087	2,099	+ 12
From United Kingdom	1,579	1,707	+ 128
All electric wires and cables detailed above—			
Total	8,135	9,041	+ 906
From United Kingdom	7,096	8,014	+ 918
,, Germany	383	367	− 16
,, Netherlands	165	235	+ 70
,, Japan	5	22	+ 17
,, United States	404	292	− 112
Telegraph and telephone instruments and apparatus—			
Total	477	588	+ 111
From United Kingdom	402	492	+ 90
Electric glow lamps—			
Total	2,065	2,593	+ 528
From United Kingdom	788	676	− 112
,, Germany	135	214	+ 79
,, Netherlands	768	975	+ 207
Electric lamps (other sorts)—			
Total	1,099	942	− 157
From United Kingdom	62	114	+ 52
,, Germany	69	129	+ 60
,, United States	905	649	− 256
Batteries—			
Total	1,017	1,100	+ 83
From United Kingdom	396	133	− 263
,, United States	432	660	+ 228
Carbons, electric (including furnace electrodes)—			
Total, largely from U.K. ...	64	122	+ 58
Accumulators (including parts)—			
Total	1,670	2,220	+ 550
From United Kingdom	1,324	1,931	+ 607
,, United States	104	142	+ 38
Electric lighting accessories and fittings (including switches)—			
Total	1,506	1,555	+ 49
From United Kingdom	1,092	1,087	− 5
,, Germany	273	257	− 16
,, United States	93	161	+ 68
Electrical instruments (other than telegraphic and telephonic meters)—			
Total	551	669	+ 118
From United Kingdom	459	510	+ 51
,, Germany	48	110	+ 62
Electrical instruments (other sorts)—			
Total	280	320	+ 40
Electromedical apparatus—			
Total	176	186	+ 10
Switchboards—			
Total	409	500	+ 91
From United Kingdom	395	488	+ 93
Unenumerated electrical goods—			
Total	3,625	4,674	+1,049
From United Kingdom	2,273	2,816	+ 543
,, Germany	551	610	+ 59
,, Japan	108	110	+ 2
,, United States	584	965	+ 381
All electrical instruments and apparatus—			
Total	25,190	28,349	+3,159
From United Kingdom	16,897	18,516	+1,619
,, Germany	2,196	2,806	+ 610
,, Netherlands	1,029	1,275	+ 246
,, Italy	684	845	+ 161
,, Japan	214	333	+ 119
,, United States	3,332	3,540	+ 208

Imperial Communications.

Outline of the Imperial Conference Scheme.

IT is understood that the Imperial Conference on Means of Communicating by Submarine Cable and Wireless Telegraphy within the Empire has unanimously approved of its report, which is stated to recommend the combination of all means of communication throughout the British Empire, excepting those in the British West Indies. The decision of the Conference, which has been sitting under the chairmanship of Sir John Gilmour for several months, must be approved by the Cabinet and afterwards by Parliament, as a special Act will be needed to put the scheme into operation. The details are being considered by the Governments of the Empire represented at the Conference, which are understood to have agreed to sell their cables outright for cash, and to lease for a definite period of years their "beam" wireless stations, while retaining the wireless telephone service, which it is thought will continue to be operated directly by the Post Office. It is believed that the cables and the lease of the "beam" wireless stations will be transferred to a new "operating company," to which also will be transferred the working assets of the existing private cable companies and of the Marconi Company, and it will be administered on the lines of private ownership, with semi-public control.

Its board of directors will be elected by the Board of the projected "merger" company, which has already been framed to amalgamate the interests of the privately-owned cable companies and the Marconi Company, with two of the members subject to approval by the Government.

There will be an Advisory Council, on which the Dominions will be represented, to review policy and the distribution of the earnings, for a condition will be imposed that, out of any profit exceeding the present level 50 per cent. will be applied either in reducing charges to the public, or in providing additional facilities by way of development.

The Corporation will include the following properties :—

The Eastern Telegraph Co. and its associated companies serving the Empire.

All the Marconi associated wireless companies, in partnership with the Governments, or otherwise, in India, South Africa, Australia, Canada, and Egypt.

The Pacific Cable Board, which owns two cables between Vancouver, Australia, and New Zealand, and belongs to the Governments of Great Britain, Australia, New Zealand, and Canada, whose representatives form the Board.

The British Post Office "beam" radio-telegraph stations communicating with the Dominions, and also its transatlantic cables, which will be leased to the new traffic Corporation.

Purely traffic operation and non-Imperial interests will be separated, as Government participation was not desired in manufacturing and extraneous undertakings. Therefore there will be another company which will combine all the interests of the Marconi Co. and all the remaining interests of the Eastern Telegraph associated companies. It is understood that the Marconi and cable companies' merger arrangements, whereby a new company is to be formed with a capital of £53,700,000, will remain unaffected.

All interests combined must be British, and in times of national emergency the whole organisation will pass under State control. An important proviso is that the operating Corporation will be entitled to a fair standard dividend, after which the profit will be divided in equal proportions between the State and the Corporation. In Canada the Marconi interests are under Canadian control, but they will, it is hoped, be linked with the new combination.

Electrical Contractors' Conference.-III.

Proceedings at Cheltenham.

THE Cheltenham Conference was favoured with rather better weather than that experienced at Scarborough, although rain was not entirely absent. The business sessions were well attended by delegates, and their ladies also showed their interest by their presence. Two of the papers were well discussed, but Mr. Orringe's met with what may be considered tacit agreement. Mr. Rawlings's call to contractors to warn the public of the potential danger lurking in unearthed appliances was well received, and nobody appeared to anticipate any falling-off of work in consequence. The paper on the E.C.A. Trading Policy by Mr. Marryat evoked the views of two or three representatives of prominent manufacturers and wholesalers, and raised an interesting discussion which we propose to report, with the paper, in our next issue. If, as Mr. Marryat stated, there is a factor for every five retailers, there is no wonder that dissatisfaction and dissent exist among all branches of the electrical industry. There appeared to be general agreement that there was room for a dictator or dictatorial body to hear all parties and deliver judgment.

At the Council meeting with which the proceedings opened on July 4th, Mr. W. A. Shaw, the retiring president, was presented by his colleagues on the Council with an inscribed silver salver. In one of our illustrations Mr. Shaw is seen with his presentation. At the same meeting it was decided to give active support to the Factory Lighting Campaign which is being undertaken by the B.E.D.A. In addition to increasing the ordinary subscription from £400 to £600, an additional £500 is being contributed especially for the Campaign. The total is equal to about a pound per member, which represents very substantial support. Mr. Tweedy-Smith, the Association's solicitor, was prevented by serious illness from attending the Conference; the Secretary was instructed to write expressing the delegates' hope of his speedy recovery. Mr. H. J. Miles, immediate past-president of the E.C.A., and Mr. F. W. Purse, immediate past-president of the I.M.E.A., were both unable to be present on account of the illness of their wives. Regrets and best wishes were also sent from the Conference to these gentlemen.

At the concluding session of the Conference Mr. Shaw moved a comprehensive vote of thanks to all who had helped to make the event the success which it undoubtedly was. He made special reference to the Mayor and Corporation who had placed the magnificent Town Hall (one of the finest in the country) at their disposal for their business meetings and social functions;

Mr. H. Marryat.

Mr. F. C. Polden.

Mr. W. R. Rawlings.

Mr. W. A. Shaw.

Some of the Cheltenham Delegates.

Mr. Willoughby Ellis.

Mr. T. E. Alger.

Mr. Ll. B. Atkinson.

Lt.-Col. W. A. Vignoles.

More Delegates and Visitors.

Mrs. Bisset, manageress of the Corporation's Information Bureau; the local stewards, including Messrs. Marshall and Bastin; the lady stewards; the authors of the papers; and the borough electrical engineer of Cheltenham (Mr. W. J. Bache). Mr. Shaw said that all sections of the industry were represented at the Conference, and many useful "contacts" had been made. There should be harmony among all the parties for their general good. The contracting industry was suffering badly from the "jerry" contractor, and they would not get rid of him until they had a national code of regulations, until all supply undertakings insisted upon a high standard of work, and until wages were the same in each district to prevent undercutting. The Electrical Association of Women had held a meeting during the Conference; all contractors should encourage their wives to become members of the Association. The E.A.W advocated "more outlets" which meant increased business for contractors in all directions. Referring to the papers which had been presented, Mr. Shaw said that he was in entire agreement with Mr. Rawlings upon the subject of earthing. Mr. Orringe had shown Leicester to be an example of co-operation which all municipal authorities and local contractors should follow. Mr. Marryat's paper had pointed the way to better conditions in the industry, and would have the support of all of them.

Mrs. Ll. B. Atkinson and Miss Haslett.

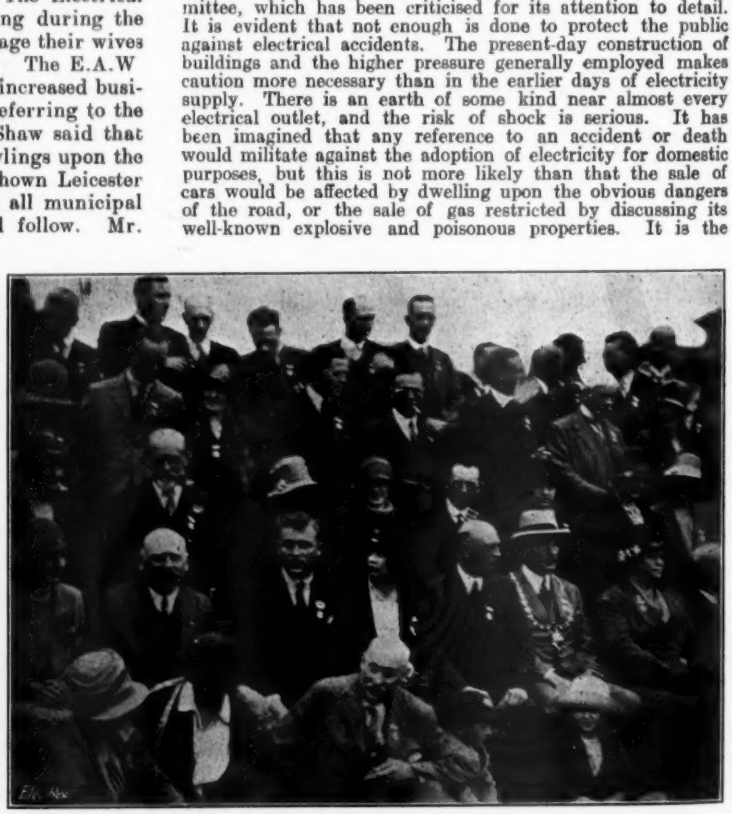
In seconding the vote of thanks, Mr. H. J. Galliers said that the outstanding success of the Conference had firmly established it as an annual event to which all contractors would look forward.

The Deputy-Mayor of Cheltenham acknowledged the vote, and said that he had had personal experience of "shoddy" electrical work. He hoped that the Association would be successful in securing that tenders should only be made to a high-grade specification.

Introducing the new President, Mr. W. H. Walton, Mr. Shaw said that his successor had earned the gratitude of the Association for the vast amount of work which he had done for it during a long period. He had been chairman of the London branch, which was no mean task, and he had also occupied the chairmanship of the Southern Section, a position which Mr. Willoughby Ellis, the new vice-president, was just relinquishing. He then invested Mr. Walton with the badge of office.

Mr. Walton then delivered a short address, in which he briefly indicated the future work of the Association. We propose to deal with this in our next issue. After Mr. Shaw had expressed his personal thanks for the support afforded him by the general secretary (Mr. L. C. Penwill), the editor of the *Electrical Contractor* (Mr. R. W. Kennedy), and the staff, Mr. Willoughby Ellis moved a vote of thanks to him. The speaker said that Mr. Shaw had concluded his second term as president, and he had occupied every office in the Association. He had set an example which future presidents would find very difficult to follow. He had consented to act as chairman of the Development Committee—a very arduous task. In conclusion, Mr. Willoughby Ellis said that the Association's thanks were also due to Mrs. Shaw for the support which she had given her husband. The vote was seconded by Mr. J. H. Edwards, and accorded with acclamation. Mr. Shaw briefly responded, saying that for years Association work had been his hobby.

The photographs which we reproduce herewith show some of the prominent electrical people—contractors and others—who attended the Conference. Abstracts of two of the papers, with the discussions, follow.



The Centre of the Group Posing for the Official Photograph.

Earthing as a Safeguard to the Public.

(Abstract.)

By W. R. RAWLINGS, A.M.I.E.E.

The author commences his paper with a reference to the "hush-hush" attitude so widely adopted in relation to electrical accidents, and to a paper upon the subject earthing read before the I.E.E. in 1919—the work of Messrs. G. Scott Ram, J. Frith, G. H. Nisbett, and A. L. Taylor. In this it was recommended that earthing conductors should be of adequate size according to their application; that no conductor should be smaller than No. 14 S.W.G., conductors larger than this being stranded; and that they should be of h.c. copper protected against corrosion and injury. These recommendations have been supported by the I.E.E. Wiring Rules Committee, which has been criticised for its attention to detail. It is evident that not enough is done to protect the public against electrical accidents. The present-day construction of buildings and the higher pressure generally employed makes caution more necessary than in the earlier days of electricity supply. There is an earth of some kind near almost every electrical outlet, and the risk of shock is serious. It has been imagined that any reference to an accident or death would militate against the adoption of electricity for domestic purposes, but this is not more likely than that the sale of cars would be affected by dwelling upon the obvious dangers of the road, or the sale of gas restricted by discussing its well-known explosive and poisonous properties. It is the duty of those engaged in the electrical industry to safeguard the public and point out where dangers exist. If the public appreciated electrical possibilities they would not allow inexperienced persons to interfere with their installations. Members of the public can protect themselves by employing E.C.A. members or registered contractors. The author thinks that the time is not far distant when it will be illegal for any unqualified man to install electricity.

It is difficult, owing to the policy of suppression adopted by the industry, to obtain information regarding electrical accidents, except from the Home Office factory reports. The number of industrial electrical accidents has been reduced by the system of inspection and prosecution; if the same course were adopted in connection with shops and houses the number of prosecutions would be far greater. Nobody at present can enforce the Wiring Regulations; even the fire insurance companies are afraid to take action for fear of losing business. After quoting a passage from a report by Mr. G. Scott Ram (H.M. Electrical Inspector of Factories), the author points out that although there are more accidents in connection with d.c., they are far less serious from the point of view of danger to life than a.c. accidents. Therefore, with the present changing-over from d.c. to a.c., there is almost sure to be increased danger to life unless strict regulations are enforced. Further quotations from Mr. Scott Ram's reports show that the method of testing earth connections by means of a "Megger" or other instrument for high-resistance or insulation tests is useless; and that portable tools without an earth connection are a grave source of danger. I.E.E. Regulation 96 B (a) says: If the conditions are such that a person touching any metal liable to become alive should the insulation become defective is likely to be simultaneously making contact with earth, such metal shall be earthed." There can be no doubt that, in the average house, one is always liable to make contact with earth, hence this rule really calls for earthing all portable apparatus. One universal 3-pin standard plug and connections should be compulsory. Not only would this give an important safeguard to the public, but plugs, &c., would be cheaper; interchangeability of the plugs would be secured; and, being polarised, the flex leaving the plug could be at any desired angle, giving increased life to the flexible cord. If earthing is adopted it must be properly done. There is no doubt that a large number of fires have arisen from a faulty earth wire or from one that was too small for the duty it was called upon to perform. It is obvious that if a large current is trying to reach earth through too small a conductor, overheating must arise. The shrouding of lampholders, switches, plugs, &c., will not afford the protection necessary to safeguard the public against all the troubles referred to. In the near future, when 3-phase 230 a.c. with one pole earthed is universal, everyone will be exposed to a death-dealing current. Furthermore, there is a higher voltage between each phase, and it is therefore of the utmost importance to all electrical contractors that their position in this matter be seriously considered and safeguarded. A cable is brought into a building by the supply authority, having two, three or four conductors which are terminated into s.p. fuses. There is 230 V between each of the three phases and the earth neutral, and 400 V between each of the phases. The word "Danger" is not too strong a warning to be added to those terminals, but there is a fear of alarming the consumer. There is no argument against the use of a proper tablet indicating danger where danger exists. Some serious complications are foreshadowed when more than one phase becomes general in a building. Extensions may be made by somebody without the requisite knowledge, or without being informed as to the exact position with regard to the supply. Indeed, a trained wireman has nothing whatever to guide him when examining the fuses in basements of the type to which reference has been made.

The higher voltage may mean economy in distribution, but it is doubtful whether any real economy is effected to the consumer with the added danger. The author holds the same opinion as was recently expressed in the ELECTRICAL REVIEW, that there can be no certainty that the earth wire is intact and effective, however carefully the original installation was carried out. Unless there is some system whereby the failure of the actual earth connection is made evident, earthing becomes a menace and a false security. If a complete concentric system with the outer neutral uninsulated is maintained, there must be absolute security, for in the event of the earth connection being broken, the supply is cut off automatically. Mr. A. H. Dykes has given the author a very favourable report upon the system, and shows that there is no possibility of any contact between the high-pressure inner conductor and outside objects, as it is shielded effectively by the surrounding earthed conductor. The system has been employed in many districts with complete success. Another important factor of the system, apart from security to life, is the fact that only one insulated wire is necessary; and that s.p. switches, s.p. fuses, &c., form a complete equipment for all installations. This would bring about, if universally applied, a very considerable reduction in installation costs. The author thinks that the Electricity Commissioners should give the matter their serious consideration.

In spite of what the electrical Press says, the author states, there are many fires, not only in houses provided with an electrical service, but in buildings without any electrical equipment, due to semi-earth leakage breaking out at a distance and fusing and firing gas pipes. He quotes two instances in support of this view.

After stressing the necessity of educating the public to bring home to them the dangers which exist in their homes, the author concludes by saying that contractors must, without fear of damage to the industry, be honest in all their dealings with, and advice to, the public. They know the dangers which lurk beneath a flimsy installation, and they should, in justice to the public, do all that they can to protect the public's lives and property.

Discussion

Opening the discussion which followed the reading of the paper, Mr. C. H. FLOWER said that the matter concerned manufacturers as well as contractors. It divided all of them into two parties—"earthing" and "non-earthing." Although there was generally little risk of shock in the home, in certain rooms, such as the kitchen, there was real danger. The extra cost of providing earthing was negligible.

Mr. W. CROSS said that at first sight the paper gave the reader a shock. It might be thought that it was foolish to tell the public of the dangers of electricity, but actually it was better for the industry to do so. There were many bad installations, but very few accidents. Both in factories and homes the greatest danger arose from alterations and repairs being made by incompetent persons, especially in country houses. Mr. Scott Ram's reports dealt only with shock and not with fire; in the latter respect a.c. was safer than d.c., as electrolytic troubles were avoided. The manufacturers said that there was no demand for earthing means on appliances, and both they and the contractors needed a great deal of education in the matter. He did not agree that "Danger" notices should be placed on service fuses, which were usually sealed, but the fuses and meters should certainly be earthed. Concentric wiring would get over many difficulties, but it brought one or two troubles in its train. For instance, B.O.T. regulations only allowed supply authorities to earth their systems at main or sub-stations. Again, was it desirable to earth a factory installation at many points and thereby set up circulating earth currents? Then there was electrolytic action between the metal sheath and brass fixing clips; that perhaps could be prevented by taping the cable at the clips. Earthing meant extra expense, and it might be better to advocate thorough insulation. Manufacturers could do more than anybody to push the matter forward.

Mr. H. MOSS said that in one part of the paper Mr. Rawlings had said that persons touching a live wire in certain circumstances would receive a fatal shock. He thought that "might" should be substituted for "would," and Mr. Rawlings agreed. Mr. Moss said that it was better to educate the public through the Electrical Association of Women than to frighten them. Contractors should give every support to the E.A.W.

Mr. WILLOUGHBY ELLIS said that with three-phase energy he never used an open three-phase board. He employed a distribution board with a sealed cover and took off each phase and neutral to separate boards. He had preached the concentric system many years ago, but it had been received without enthusiasm. He had found the system to be safe and efficient, and the continuous earth was of great advantage. Joint boxes should not be used with the system; all wires should be continuous and looped. Leakage between the inner and outer conductors in damp places could be averted by properly isolating the ends. Where 440 V was being used he made a practice, wherever possible, of putting in a double-wound transformer stepping down to 110 V. The no-load losses in the transformer were compensated for by greater lamp efficiency.

Mr. C. W. SULLY said that the real problem was how to get earthing adopted by the industry as standard practice. It was difficult to persuade the public to adopt anything which might cost more. The ideal could be helped along considerably by the "Circle" system which had been organised by the B.E.D.A. The E.A.W., which the contractors should support, was calling for "more outlets"; there was an excellent opportunity of advocating the practice of earthing.

Mr. L. B. ATKINSON said that, as chairman of the I.E.E. Wiring Rules Committee, he had heard all points of view on the subject of earthing. If electrical men knew that a risk existed it was only fair to the public to let it know that the risk existed. The changing-over of the system of supply presented a favourable opportunity to give the public a gentle warning. They need not mention "death"; it was quite sufficient to indicate that there was a risk of shock. Years ago he had run a station in London which employed the concentric system. The chief difficulty to-day with regard to that system was the lack of suitable appliances. Unless they could persuade the manufacturers to provide these they would be badly handicapped. He thought that every building should be wired with three wires—two to carry the current and the other used as an earth wire. There was no doubt that there was grave risk of shock in the home. In his own house there were only two rooms, he considered, in which it was really safe to use unearthed appliances. All three-pin plugs should be so made that it was impossible to use two of the pins only. There were now available wiring systems in which an earth wire was laid under the metal sheath and that adequately met the requirements. There was special danger of shock where electrical apparatus and radio apparatus were in use in the same room, and the public should be warned.

Mr. RAWLINGS, in the course of his reply to the discussion, said that it was clear that one did not know what a consumer was likely to do. He agreed that contractors should strongly support the E.A.W., which was doing a great deal to increase the use of electricity in the home. It was a simple matter to bind up the ends of concentric cable with insulating tape, and thereby keep out moisture. With regard to the rest of the installation, he said that 4,000 switches had been fitted in an institution as part of a concentric system, and only one of them had broken down, being in a damp situation. He,

similarly to Mr. Willoughby Ellis, used transformers wherever he could. In hundreds of installations at Hazlemere two wires in a tube with one of them earthed were in use; the same result could be obtained at a lower cost by the use of one bare wire and an insulated one. He believed that Messrs. Mavor & Coulson had a system which was concentric right down to the lampholders. He thought that the system would return to favour on account of its safety and efficiency. In conclusion, he said that he was glad that his paper had met with such a measure of agreement. Many were thinking along the same lines, but were afraid to say so.

Electrical Development and Retail Sales.

By JOSEPH ORRINGE, A.M.I.E.E. (*Abstract*).

The full title of this paper is "Electrical Development, with Special Reference to Retail Sales." The author commences with a comment upon the rapid growth of the electrical industry, and points out how necessary it is for electrical installation engineers to be constantly on the alert to improve and consolidate their trading position. Concentrated attention should be devoted, in particular, to the question of "retail sales." How are installation engineers to develop and stabilise their position as the recognised retailers of electrical equipment to all consumers of electrical energy? In this matter there are, in the author's opinion, three all-important essentials:—

(1) There must be favourable domestic tariffs to encourage the use of electrical energy for all purposes—lighting, heating, cleaning, cooking, and water-heating. (2) Every opportunity must be used (and, if necessary, such opportunities must be created) to enter into the fullest co-operation with all other sections of the electrical industry. Contractors must seek and use every opportunity to work in businesslike harmony with supply authorities, with manufacturers and wholesalers, and with the representatives of their employés. (3) They must have a clearly-defined trading policy—on the lines of the E.C.A. Trading Policy—mutually agreed upon *and enforced* by all sections of the trade immediately concerned.

The question of simple and favourable domestic tariffs is almost entirely in the hands of the supply authorities. It must be admitted that, particularly during the past year or so, the price of energy has been reduced, and systems of charging have been simplified, in many important areas; but it is sincerely to be hoped that this good work will continue in the immediate future with all possible vigour.

Cheap electricity, indeed, is vital to our national progress, while its value to all sections of the electrical industry, to electrical manufacturers, wholesalers and installation engineer retailers is too obvious to call for any elaboration. In those areas where the fullest possible co-operation exists between the supply authority and members of the E.C.A., the results are not only gratifying to all parties concerned, but they also secure the very best possible service to the public. As an example of the progress brought about by sane, businesslike co-operation between a supply authority and local electrical contractors, the progress made by the Leicester Electricity Department is quoted. It is shown that the amount of energy sold for lighting (excluding streets and factories), cooking and heating, and combined domestic use has grown as follows:—1922, 4,006,742 kWh; 1923, 5,454,754 kWh; 1924, 7,611,581 kWh; 1925, 10,119,046 kWh; 1926-27 (15 months), 18,560,293 kWh.

The Leicester Electricity Department confines its energies almost entirely to the economical generation and distribution of electrical energy, leaving the sales side entirely in the hands of local installation engineer retailers. The immediate consequence of this policy is that the working costs of the Leicester undertaking are very low, while the charges for electricity in the area are distinctly reasonable. The domestic tariff involves a standing charge of 1s. 2d. per quarter per lampholder installed, with a flat rate of 1d. per kWh for all energy consumed. The Leicester works costs are 0.96d. per kWh; only 30 other municipal supply undertakings exhibit a lower figure than this. The Department does not employ a single person outside the Corporation showroom whose duty it is to canvass for new consumers. Local installation engineers and their staffs canvass freely to secure new consumers, and the keenest competition prevails. The Department will "survey" a new district from time to time in order to ascertain whether mains extensions are justified; but directly cable-laying commences all possible new consumers are vigorously canvassed by local installation engineers. The Department's showrooms—fine, spacious premises situated in the best shopping street in Leicester—are run on co-operative lines, no sales being invoiced direct to the public. The whole of the stock displayed has been purchased outright by a syndicate of local installation engineers, a fixed amount being paid to the Electricity Department towards the cost of the showroom, its supervision and administration. Well-organised electrical showrooms—as distinct from "electrical shops"—are essential for the education and enlightenment of consumers and would-be consumers, and they are equally essential to the general welfare of the entire electrical industry. Electrical installation engineers may justly claim that they are best qualified to control the policy of retail sales to the public, but they must not shirk their responsibilities when questions arise concerning the provision of facilities for electrical demonstration purposes. One well-organised and properly-equipped electrical showroom is better than half-a-dozen unsuccessful "attempts." It may not be a business proposition for every reseller to have a properly-equipped showroom or to have his own salesmen and demonstrators; but it *is* a business proposition for two or more resellers to co-operate with a view to improving their sales organisation and in order to reduce establishment charges.

In Leicester there is a specialised showroom, devoted to the sale of electric refrigerators, which is run jointly by two members of the Electrical Contractors' Association; this principle of joint showroom ownership is capable of considerable development in other parts of the country. In the same way, in Leicester, a number of installation engineers have joined forces in order to meet American sales methods in connection with vacuum cleaners.

Where effective electrical displays have been established, the retailers concerned should enjoy the very lowest possible tariff from the supply undertaking for demonstration and display purposes. Only by persistent "after-closing-hour" lighting of their own business premises will they persuade shopkeepers in general to organise "better and brighter business thoroughfares"; but it is neither reasonable nor just that the whole cost of this propaganda work should fall on the shoulders of the electrical trader enterprising enough to arrange the initial display. Special rates would encourage electrical traders to make these and other similar displays. It appears that the principle of advertising by light, and by electrical display in general, has not as yet become very widely recognised among supply authorities. Increased business and benefit would be conferred on all sections of the electrical industry by a closer co-operative understanding between supply authorities and electrical installation engineer retailers; and similar co-operative understandings with manufacturers are also called for in order to deal with stock depreciation occasioned by active demonstration. It is to the manufacturers' advantage that their equipment be demonstrated with the utmost freedom, and ways and means must certainly be found to deal with the inevitable depreciation that takes place. A preferential discount for showroom display purposes might meet the case.

By taking an increased interest in their employés, contractors could encourage them, and make it worth their while, to co-operate with them in developing retail sales. The charge-hand or wireman *inside* the home is in the best possible position to suggest the use of additional equipment and electrical conveniences, and it is a matter for serious consideration whether or not such sales possibilities should be actively encouraged and placed on a reasonable business footing.

Only a short time ago electrical shopkeeping was very speculative. There were few things to sell and still fewer people desired to purchase them. Nowadays, however, the range of electrical merchandise is very wide indeed, and in the author's experience electrical shopkeeping is a paying proposition that is improving in value almost day by day. Indeed, some installation engineers claim that their "shop-keeping" is far more profitable than their installation work.

In conclusion, Mr. Orringe says that electrical contractors who are called upon to-day to give so much "service," and to accept almost unlimited responsibilities and liabilities, *must* have a firmly maintained trading agreement at their backs. They must obliterate the term "trade user" from their vocabularies and institute a list of "registered users" who would be entitled to discounts or rebates based solely on their quantity buying. Equally they must be in a position to execute any order, with appropriate discounts, from any customer, large or small; and when these fundamentals have been arranged he is confident that it will be possible for electrical installation engineers to trade not only without tears but equally without fears.

Discussion.

Only one speaker rose to discuss the paper. He was Mr. H. Moss, who considered that contractors had failed to give sufficient thought to the retail selling side of their business. Effective showrooms and shop-windows, even small ones, were the best means of advertising the goods which they had to sell. Besides being engineers, they had got to be shopkeepers, otherwise valuable business would go to ironmongers and similar people. Too often appliances were sold by incompetent people who were doing harm to the industry by allowing the public to use fires and other large appliances by simply plugging them into lampholders. Some contractors thought that they were above retail selling, but there was nothing in it to be ashamed of.

Mr. ORRINGE said that he was very disappointed at the poor response to his paper. He had hoped that contractors were beginning to realise the importance of retail selling. He could not agree that small showrooms here and there in a small town were effective. It was far better for all the contractors to combine to open one properly-equipped central showroom. He did not fear the competition of large stores and ironmongers; only electrical men could give the service which led to satisfied customers. In conclusion, he said that many contractors were at last beginning to realise that they could not make a living out of conduit, wire and labour.

The Institution of Civil Engineers.—VI.

Celebration of Charter Centenary, and Engineering Conference.

Prospective Development in the Generation of Electricity and its Influence on the Design of Station Plant.

(Abstract.)

By STANDEN LEONARD PEARCE, C.B.E., D.Sc., &c.

THE policy underlying the Electricity (Supply) Act of 1926 will have the ultimate effect of reducing very substantially the number of generating stations required in this country, and will increase the total capacity of those selected to carry the base loads. The following important factors will influence the design of stations and plant: the employment of larger steam units; the adoption of higher steam pressures and temperatures; and the use where possible of higher voltages.

To-day the rating of the largest single generator under construction in this country for operating at 1,500 r.p.m. is about 40,000 kW, and of that projected 62,500 kW. These may appear small in comparison with machines of 75,000 and 160,000 kW, respectively, which have been constructed or are under construction in the United States. By an appropriate grouping of units of the foregoing ratings, on two or three line shafts, there is no inherent difficulty in the way of producing a total rating of 208,000 kW, as in the case of the new State Line generating station in America.

Boilers generating 250,000 lb. of steam per hour and upwards have been constructed for working pressures up to 1,500 lb. per sq. in., and there appears to be no inherent difficulty in obtaining a boiler capable of operating a 50,000-kW set. The need for such units may be questioned in this country, and will be mainly determined by considerations bearing on the capital cost in relation to prospective demand. The selection of very high pressures and temperatures and large outputs may render it desirable to subdivide the main units on two or more line shafts operating at different speeds.

Pressures within the limits of, say, 350-750 lb. per sq. in. do not call for radical alterations in the design of the plant beyond added strength to resist such increased pressures. It is necessary to emphasise the greater influence exerted on thermal efficiency by increasing temperatures rather than pressures, and the need for concentration on the problems arising therefrom. It is hoped that the nickel-chrome-molybdenum steels and other special alloys suitable for withstanding corrosion and erosion will maintain their tensile strengths when operating within the limits of, say, 850 deg. to 900 deg. F. The cost of such materials is important, but parts subjected to the higher temperature form an inconsiderable section of the plant as a whole. Boiler-pressures of 500 to 600 lb. per sq. in. may now be regarded as standard.

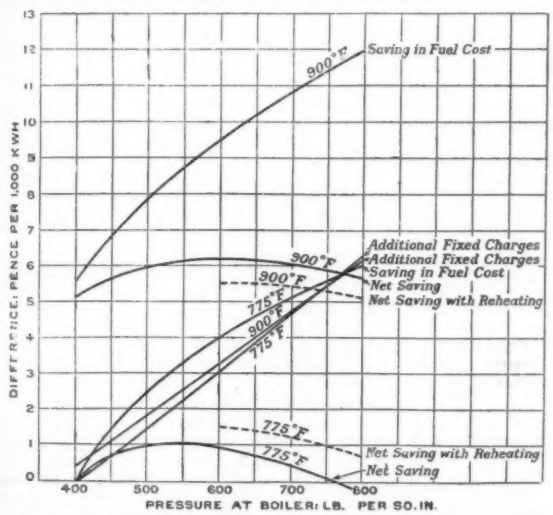
With the higher temperatures referred to reheating would not appear to be necessary, as the wetness-factor is not excessive—more especially if the bleeding stages of the turbine are correctly arranged. There is no evidence to show that with the adoption of high pressures and temperatures the reliability of turbine or boiler plant has been sacrificed for the admitted thermal gains, or that the operation of such plant has presented serious difficulties.

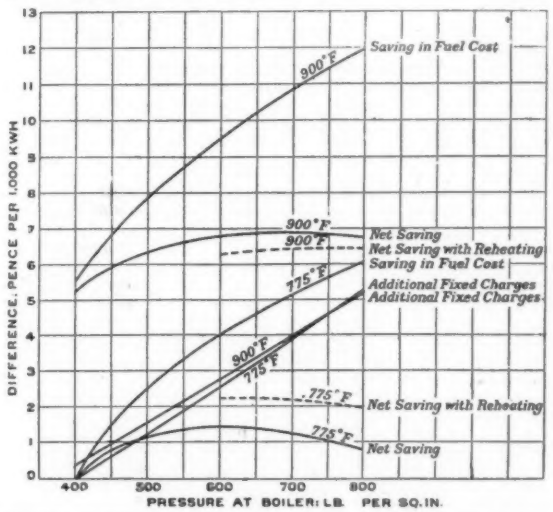
For all new base-load stations operating at load factors of 50 per cent. and upwards, there appears to be a distinct commercial gain in adopting a working pressure of about 600 lb. per sq. in.—and possibly somewhat higher where the load factor well exceeds 50 per cent—and at the same time in utilising the maximum temperatures permissible with the materials available. Above this limit the thermal gains appear to be outweighed by the increased capital costs (see figs. 1 and 2).

With regard to condensing plant, the cooling surface provided per kW generated shows a steady decrease, the figure of 1½ sq. ft., common a few years ago, having recently been reduced to 1, and in some cases even to 0.8.

Single condensers have been built with a cooling surface of 60,000 sq. ft., and main units have been arranged with as many as eight independent condensers, but these are abnormal, and with main units of 50,000 to 60,000 kW maximum continuous rating twin condensers are becoming standard.

Experience has shown the desirability of reducing the oxygen in feed water to below 0.1 cu. cm. per litre, to prevent corrosion, the deleterious effects of which are becoming more important as steam is generated at higher pressures and temperatures. The feed-heating plant should be designed in conjunction with the boiler plant, to ensure the maximum overall thermal efficiency obtainable. A maximum temperature rise of about 60 deg. F. per stage represents the best compromise between the theoretical desirability of an infinite number of stages of heating and the practical considerations of arrangement and cost.





Fixed charges, 10 + 2 = 12 per cent.; cost of coal delivered, 17s. per ton; steam temperature at boiler stop valve, 775 or 900 deg. F.; differences referred to 400 lb. per sq. in. and 775 deg. F. at boiler stop valve.

Fig. 1.—Economy Curves for 50 per cent. Load Factor.

Fig. 2.—Economy Curves for 60 per cent. Load Factor.

Owing to transport difficulties there is a tendency to adopt a fabricated structure of steel framing for the stators of large alternators. The limit in the size of solid steel rotor forgings, in the case of sets running at 1,500 r.p.m., is about 40,000 kW.

The sizes of generators are limited by difficulties arising from the relatively heavy stator currents, and the difficulty of ensuring equality of the electromagnetic conditions in the separate components of heavy laminated conductors, without unduly reducing their cross section in places. There is also a limit to the current that can be conveniently conducted from the terminals of a large generator. These difficulties have, however, in some cases, been minimised by the employment of two distinct windings on a single generator.

Generator stators are being wound for full line pressure, eliminating the use of step-up transformers, but the advantages of such high-pressure windings appear to be counterbalanced by the following disadvantages: high-voltage generators are less efficient than those for lower pressures; the stator windings are mechanically weaker, and their satisfactory insulation is extremely difficult; in the absence of step-up transformers or external reactance-coils, the reactance required for limiting short-circuit currents to values within the rupturing-capacity of the switchgear has necessarily to be incorporated in the stator windings, with the natural consequence that under short-circuit conditions the mechanical forces on inherently weaker windings are appreciably increased; the elimination of delta-star connected transformers between the generators and the high-pressure busbars may result in trouble due to harmonics in the generating wave-form, if the transmission system consists mainly of cables having relatively high

capacity; and, furthermore, unless the insulation on the end turns of the stator windings is heavily reinforced, trouble due to voltage transients is very likely to occur. Some interesting developments are foreshadowed with the employment of hydrogen gas as a cooling medium; whether the diminution of losses will outweigh the extra cost, or not, is problematical.

With the growth of generating and transmission systems, transformers are becoming of extreme importance, because of the unique and simple facilities which they provide for an illimitable range of pressure ratios and their relatively high efficiency. Recent developments in design and construction have raised both the output and the voltage, and it is difficult to set any limit thereto. For large units the forced oil-cooled type employing external air- or water-coolers is likely to be favoured, coupled with a more extended use of the outdoor type of unit. Voltage control is likely to become more important in the future in connection with supplies to the "grid," and this will be effected by induction regulators, booster transformers, or tap-changing equipments.

Switchgear is probably the principal limiting factor in electrical power development, this being one of the main reasons for the employment of current-limiting reactances. It is seemingly safe to say that high pressures are more easily handled than heavy currents, which give trouble, owing to the heating of contacts, eddy-current effects, skin effects, and the relatively enormous magneto-mechanical forces. Heavy contacts necessitated by heavy currents involve heavy switch movements, which again react unfavourably on other features of design. On the other hand, however, higher pressures demand larger clearances, and consequently lack of space and economic considerations frequently lead to the employment of gear of the metal-clad type—a more extended use of which may result from the development of large power stations.

For voltages in excess of 33 kilovolts the tendency is to adopt the outdoor station type of switching equipment, or, alternatively, the hall type of gear. For voltages below 33 kilovolts the cellular type of gear is still widely adopted, with or without phase isolation. It is doubtful whether the additional space and cost incidental to phase isolation can be justified.

Increasing attention is being given to busbar insulation and means for dealing with the spread of smoke or gas-vapour arising from local troubles. Oil circuit breakers have been developed for a designed breaking capacity of 2,000,000 kVA.

Discussion.

Mr. C. P. SPARKS, C.B.E., said that in this country they had reached a moderate level of prices; electricity was comparatively cheap, but the whole trend was to lower the price further where possible. That would give rise to a prospective development of an enormous size. The development of the domestic supply and the attention that was being given to the sales side would be the dominant factors in boosting the business on a scale which would have a marked effect, not only on output, but also on load factor. He entirely agreed as to the importance of turning attention to the increase of steam temperatures rather than steam pressures; after all, the gain in prospect with increasing steam pressures was limited, as compared with what could be done on the temperature side. He was not content with 900 deg. F.—he would like to see higher temperatures—but unless they spent money on research, they would never get there. With regard to combustion, there was an enormous field for prospective development, both for stokers and powdered fuel. He thought that fixed charges would tend to decrease; the capital cost of plant would tend to decrease, so decreasing fixed charges. On the other hand, the general world tendency would be for the cost of fuel to increase. The result would be an increasing tendency to increase steam temperatures and steam pressures.

Dr. JOHN W. LIEB (U.S.A.) said the author's conclusions about the adoption of standard pressures were thoroughly substantiated by American experience. It was all very well to go to 1,000 and 1,200 lb. per sq. in., but it was extremely difficult, unless the circumstances were unusually favourable, to justify the additional expenditure. An extremely interesting problem had to be faced, *viz.*, the question of procuring an amount of plant having a high capacity at a very low cost. There was still uneconomical plant which might be superseded from other points of view, but which it was economical to keep in operation—turbine units of 5,000 to 10,000 kW, some of them of the vertical type—on account of the enormous advantage of being able to put them on the line within a minute or two. It was very important that they should have switchgear that would take care of anything that came along. The mere multiplication of reactances and reverse relays did not completely solve the problem, and in the States they were not entirely satisfied with the status of the switchgear and the part which it played in central station operation. In the most highly developed sections of New York City there was, for instance, one square mile in the centre of Manhattan Island where there was 108,000 kW of demand to a square mile; and in a selected portion of that square mile there was something like 15,000 kW of demand.

Sir PHILIP NASH spoke of the changes which would be brought about by the Government scheme under the 1926 Act, and said that that must affect very largely the plant put into the new stations. He did not advocate taking undue risks, but he did advocate co-operation between the manufacturers and the owners of the plant for carrying out experiments which would result in progress. The new large stations which would be interconnected gave them an opportunity to progress on those lines which they had never had before. The manufacturers' problem in turbines was a quality problem—the quality of product. To generators, transformers and switchgear the same remark applied, but not to the same degree. With regard to boilers the United States could show results which were better and more progressive than what had been achieved in this country; that had been due to co-operation on the lines suggested. There never had been a greater necessity for some fundamental change in the design of switchgear, which was far more important and wanted far more than any other equipment.

Dr. S. Z. DE FERRANTI said that the designer of the central station had to take cost and probable demand into account, and he pleaded for any error to be made on the side of perhaps spending too much and getting more economy than was justified for the moment, because he believed the future of electrical development depended so much upon getting improved load factors. Storage in the form in which it was possible at present, *i.e.*, outside ordinary storage batteries, would play a very great part and, broadly speaking, the design of the load was more important than the design of the station.

Mr. ALEXANDER DOW (U.S.A.) urged the necessity for experiments on a commercial scale to prove conclusions reached in research. The ring steam main in simplified form had not yet departed, and he did not think it would. In the present state of the boiler-makers' art the cost of the boiler went up very rapidly when pressures of over 400 lb. were used. At the present time the stress upon the boiler designers to give higher pressures at commercial figures was quite strong, however, and probably they would do what was desired. As to reactances and switchgear, he prophesied that some day they would have something similar to the Fleming valve that would deal with loadings of up to, say, 30,000 kVA, and which, when the field was reversed or cancelled, would refuse to pass anything. Such a valve would deal with quite high voltages.

Mr. F. H. CLOUGH said that some means of actively cooling transformers would probably be more extensively used in order to reduce their size and cost, and he believed that water cooling would be found most suitable for indoor transformers. With regard to switchgear, the type for the future, whether metal-clad, cellular, or other forms, depended very largely on the voltage, the power to be controlled, and also to quite a large extent on the personal preferences of the manufacturers and the users. For stations of 300,000- or 400,000-kVA capacity, the circuit breakers would have to have from 1.5 to two million kVA capacities, and the distance between centres of sections and phases would give ample room for air insulating the conductors. A great deal of work needed to be done to determine what were the conditions that controlled the rupturing capacity of switches. It was, however, very difficult to put forward a basis for the calculation of switch capacity; it was very largely empirical, even to-day. For the stations in mind for the immediate future they could undertake to make circuit breakers which would give reasonably reliable service.

Mr. G. W. PARTRIDGE pointed out that it was easier to control small currents at high voltages than large currents at comparatively low voltages. With regard to the generators, and particularly the high-speed ones, where the diameter was small and the length great, it was more difficult to keep the conductors inside the insulation than the current, owing to the expansion and contraction of the copper under the various loads. Much had been said regarding the increase of steam pressure and temperature, or both, but he felt very strongly that they should go slowly in that matter. Any small percentage saving which might be effected by going beyond what were unproved limits might be insignificant in the final cost of the electricity to the consumer. It had been often said—and he believed there was a great deal of truth in it—that if they halved the cost of the fuel it would not make a very great difference in the cost of the unit when it was delivered; therefore, they were not justified to-day in taking undue risks. It seemed to him that temperatures and pressures to-day should not exceed 750 deg. F. and 400 lb. He did not understand the suggestion that 600 lb. per sq. in. could be regarded as standard; it was certainly not standard in this country. In fact, he knew of no generating station in this country running at that pressure. At 1,000 deg. F. they would be in the neighbourhood of red-hot steam pipes. He maintained that in power stations to-day simplicity of design should be the essential feature, combined with low capital costs. The auxiliaries should be cut down to a minimum, and they should require few men. A station designed on those lines would have no difficulty in arriving at an efficiency well over 22 per cent. They often saw power stations in this country containing sections being "nursed," or left in the hands of the unfortunate contractor, who had been persuaded by the designer to contract risks which he had not absolute experience of. Therefore, they were not justified in expending millions of money, unless they were absolutely sure that they were taking no risks.

Mr. M. SPYER said that at the present time there were boilers and turbines working quite satisfactorily at 800 lb. pressure and 850 deg. F. temperature in Belgium. It was possible to go to 800 lb. pressure with existing materials, but above that a more suitable material for superheaters and valves was required. He was told recently in Germany that

with the higher carbon steel which was being used there satisfactory results had been obtained at up to 1,000 deg. F. There was no very marked increase in the first cost of the material. Re-heating was far too complicated for a practical station. It had been carried out in many of the American installations with satisfactory results from the running economy point of view, but the complication and cost were appalling when looked at from the construction side.

Mr. A. H. LAW expressed the view that most turbine manufacturers would agree with Dr. Pearce in preferring high temperatures to high pressures. The difficulty with high pressures, however, was perhaps more in connection with the superheater than the turbine itself.

Mr. K. BAUMANN agreed that there was a great deal to be said for having a relatively large over-load capacity in connection with the prime mover. In the United States orders had been placed by the Hell-gate stations for two turbines each of 160,000-kW capacity; the economic rating of these units was 90,000 kW. The turbine was intended to be run at 90,000 kW. The steam consumption at 130,000 kW was 4 per cent. higher than that at its economic load, and at 180,000 kW it was 9 per cent. higher. It was perhaps very important to know that these units operated at low steam conditions; the steam pressure was 285 lb. per sq. in. For working under such conditions it was a simple matter to provide the necessary by-passes for such loads; but where higher steam conditions were adopted in order to get high efficiency, it was a very undesirable thing to do. Where high temperatures were used, anything above 750 or 800 deg. F., two by-passes meant a very big temperature change in the metal portion of the turbine, which was not a very sound proposition.

Mr. I. V. ROBINSON (B.E.A.M.A.) said that the main things required in order to improve operation were greater flexibility and overload capacity in the plant; in many power stations half the total capacity was used to generate about 4 or 5 per cent. of the output; therefore, what appeared to be required was generating plant on the lines mentioned by Mr. Baumann. All units in the main generating line—the boilers, turbines, alternators and condensing plant—should have the same flexibility. A solution of the high-pressure problem would be to have two- or even three-cylinder turbines, so that the part subjected to high temperatures could be of comparatively small dimensions, and could be made of cased steel. The alternator builders would have to devise some means of increasing the outputs of their alternators for a period of perhaps two or three hours, which was probably the maximum portion of the second order of the peak. Was it possible to increase the output of the alternator by using a refrigerator on the water-cooling side?

Colonel R. E. CROMPTON said the one thing that counted in the cost of electricity was the load factor. He had been dinning that into the industry for thirty-seven years, and it could only be done by storage; it might be water storage, but he thought they would have to go back to the accumulator.

Mr. W. H. PATCHELL, referring to the new big Benson boiler which had been put out in the open in Berlin, said they already had switchboards in the open, and the turbine also might as well be in the open. Mr. Dow had half a dozen 50,000-kW machines, which were not only run together, but were manufactured to be interchangeable. There were two more on order, so that Mr. Dow would have eight machines of 50,000 kW which were interchangeable. That was the sort of thing they had to aim at.

Dr. S. L. PEARCE, replying, said the paper represented the result of a somewhat intensified study of modern central station conditions carried out for the last six months, including all the principal stations on the Continent, as well as those in the States. With regard to metal-clad switchgear, he did not intend to convey the impression that there were actually to-day a large number of stations using such equipment; there were some, notably the Newstead station. Generally, it seemed that the meeting had supported the plea for the use of pressures of the order of 600 lb. with temperatures as high as the known state of the composition of metals would allow them to go. The very great progress that had been made in the States in connection with the development of the boiler house and modern boiler units had been entirely brought about through the co-operation of the engineers and the manufacturers, and he hoped that they in this country would endeavour to co-operate as far as possible without running undue risks. The result of his experience was that those stations which had striven to obtain the maximum thermal efficiencies were those stations which were doing the best commercially. In designing new stations they had to make a choice between a station that would secure the highest commercial efficiency of operation, consistent with reliability of service, or, on the other hand, they might adopt what would be regarded as a strictly standard design which would probably result in that particular station being more or less out of date before it was put into commission. There were no fewer than 50 stations in different parts of the world employing pressures of 500 lb. and over. There was also an admittedly large number of stations which to-day were using temperatures running up to at least 850 deg. F. The paper was not written with the experiences of this country only in view; he did not think that was the standpoint which engineers ought to take. They must look at stations all over the world and learn from the best of them. He hoped engineers in this country might have something to teach the other stations as well.

Aylesbury's Civic Week.

An Account of the Exhibition and other Local Electrical Activities.

AYLESBURY is fast making history, and the reputation for ducks which this small town of some 13,000 inhabitants in Buckinghamshire has so long possessed will soon have to give way to a reputation for an ample and cheap supply of electricity. The Civic Week, which concluded on Saturday last, afforded an excellent opportunity of driving home in a convincing manner what the Corporation is doing in the matter of electricity supply and, at the same time, of showing the inhabitants a little of the industries of the county, a rapid revival of which is confidently predicted by Mr. W. A. Turnbull, the borough electrical engineer, when the Corporation scheme for giving a supply of electricity to the surrounding villages is developed. In very few places can it be said that a supply is available in every street, yet this is the boast in Aylesbury; and in the not far distant future every village in a surrounding area of some hundred or more square miles will be in the same position. As was pointed out at the I.M.E.A. Convention at Bath, the essence of the rural scheme in the Aylesbury district is that every village shall be given a supply, and this policy the Aylesbury Electricity Committee and the Corporation intend to carry out.

There have been two features of Civic Week at Aylesbury of special electrical interest; one was the exhibition, which containd a number of intere-ting exhibits of an electrical nature, and the other was the visit of the Overhead Lines Association. The latter took place on Friday, July 6th, and although the numbers who made the journey might have been greater, those who did go were shown the first low-pressure overhead supply line built to the revised regulations of the Electricity Commissioners, giving a supply to the village of Weston Turville. It need not remain a secret that this particular line was actually erected in anticipation of the revision of the regulations; in our issue of July 22nd, 1927, we described the type of pole adopted for this supply at 220/380 volts, the line itself being of 0.1 sq. in. solid copper. The wooden poles are 17 ft. high alongside the public highways, and special attention may be directed to the threading of the line through the pole instead of supporting it on bracket insulators in the more usual manner. In some cases insulators are attached to substantial trees; several of these connections are made where the trees are in convenient positions along the pole line. Although the actual cost of construction has not yet been worked out, it will be considerably lower than what it used to be prior to the revision of the regulations and to the adoption of the progressive methods devised by Mr. Turnbull.

The General Electric Co.'s Stand.

There is a variety of generating plant in the power station at Aylesbury, consisting of Diesel engines, a large suction gas engine, and steam turbines. The bulk of the output is generated at 6,600 volts; approximately one-third is con-

verted to low pressure for distribution in the town, another third goes direct to large consumers, such as Messrs. Hazell, Watson & Viney, Ltd. (printers), the Bifurcated and Tubular Rivet Co., Ltd., and the Dominion Dairy Co., Ltd., the remaining one-third being transformed to 11,000 volts for transmission to the rural area. There are 28¼ miles of cable in Aylesbury and 73 miles of overhead lines in the rural area. In all there are some 3,000 consumers, who have connected to the supply over 700 cookers, 1,500 irons, 500 fires, 900 kettles, and 2,000 h.p. of motors, an exceedingly fine record for such a small place. Amongst present and prospective consumers, in addition to domestic supplies, are printing works, dairy produce, cement works, brick works, wood-working, boat-building, waterworks, and canal pumping; when the Government supply becomes available, the Aylesbury undertaking will be particularly well situated to receive the national supply and, having the diversity of load just mentioned, will be able to purchase electricity at a cheap rate.

The Trades and Industrial Exhibition was a well-planned affair depicting the principal trades and industries of the county as a whole. It was divided into sections, and those exhibiting in the Electrical Section were the Aylesbury Electricity Committee, the General Electric Co., Ltd., Met-Vick Supplies, Ltd., the British Electric Transformer Co., Ltd., W. Newton—an Aylesbury contractor—the Revo Electric Co., Ltd., Credenda Conduits Co., Ltd., Hotpoint Electric Appliance Co., Ltd., the Jackson Electric Stove Co., Ltd., Burnley Components, Ltd., Electrolux, Ltd., Automatic Electrical Refrigerators, Ltd., the Dowsing Radiant Heat Co., Ltd., Household Electric Supplies Co., Ltd., Hanovia Quartz Lamps, Electric Fires, Ltd. (Norwich), Morwood's (Sheffield), who showed electric cookers, and Bennett Watts, radio engineer, of Aylesbury. There was also an electric house fitted up by the G.E.C. in the manner now so familiar at exhibitions, and it may be mentioned that in the electric laundry attached to the house practical use was made of the appliances for handling the laundry of the G.E.C. staff in charge of the exhibits. This certainly is far better than the one-time procedure of constantly washing one or two pieces of cloth, merely as a demonstration.

The stand of the Aylesbury Electricity Committee aimed at demonstrating the uses of electricity for various industrial purposes, including uses on the farm There were portable drills and bench equipment, a portable saw for cutting up to 1½ in. hard wood, a portable electric planer, a "Good-egg" pumping set, small portable electric motors (including one equipped for various purposes and known as the "Farmer's Boy," in a similar manner to the apparatus known as the electric "Mary Ann," shown on another stand), and small motors for various purposes from ¼ h.p. upwards. In addition, there were cooking appliances and industrial heating apparatus.

The bulk of the apparatus shown on all the stands is familiar to our readers in that it has been mentioned in our columns from time to time, but there were a few items to which special reference may be made. For instance, the Revo Electric Co. had on view, on its cookers, its new form of red-hot boiling element, and the Credenda Conduits Co. had its super-efficient hot-plate, which attracted much attention at the I.M.E.A. Exhibition at Bath. Speaking of electric cookers generally, it was noticeable to what a large extent enamelling is being resorted to, both inside and outside, instead of the one-time familiar plain black finish. These and other domestic appliances are hired out at exceedingly low rates in Aylesbury; for instance, there are some 700 "Tricity" cookers containing two hot plates, a grill and the oven, on the mains, which are hired out at a charge of only 5s. per quarter; the wiring is done free, and an electric kettle is given in. With such low charges, coupled with the low rates for electricity already mentioned, it is not surprising that things are on the move in Aylesbury.

The Household Electric Supplies Co., Ltd., showed a simple type of electric cooker consisting of a drum, in which are fitted a shallow and a deep pan for baking; by turning the cylinder on end and placing a receptacle with some water in it, it is possible to cook a steamed meal. Mr. Turnbull is pushing this simple type of apparatus among the agricultural workers, as he believes that it will meet all their wants. Unfortunately, it is of German make, but it is hoped that British firms will turn out something on similar lines. The hire charge in this case is 2s. per quarter, again including an electric kettle.

Probably the most popular exhibit in the exhibition was an electric chicken incubator and an electrically-heated brooder, the chicks being hatched out daily *in situ*. These apparatus are in daily use by one farmer in the county, who loaned them, and an effort is being made to increase the number.

The range of small domestic electrical apparatus exhibited was necessarily large, but a special feature was made of water heaters and electric geysers by ELECTRIC FIRES, LTD., of Norwich, which also showed a 9-kW electric oil heater fitted with removable core-immersion heaters.

The special lighting demonstration of E.L.M.A. was included as part of the Aylesbury Electricity Department exhibit, as also was the shop-window display.

Although necessarily on a somewhat small scale, the arrangements at the exhibition were very complete, and included free kinema entertainment at which were shown films of an electrical educational character, such as electricity in farming, Michael Faraday, and the film shown at the I.E.E. on the occasion of the joint meeting of the Institution with the American Institute of Electrical Engineers, depicting wireless transmission between San Francisco and Plymouth. The Electrical Association for Women paid a visit on July 3rd, when special lectures were delivered, whilst on July 4th Mr. Francis, of the E.D.A., spoke on the subject of electricity in agriculture.

Finally, it may be mentioned as probably one of the secrets of success in Aylesbury that the method of charging for supply in Aylesbury itself is on a ratable value basis, plus 1½d. per unit, whilst in the surrounding area the basis of the tariff is a charge per square foot of area of the rooms, plus 1½d. per unit.

Selected Radio-Telephone Apparatus.

Recent Developments and Improvements.

The "Tungar" Trickle Charger.

The British Thomson-Houston Co., Ltd., is now manufacturing a trickle charger, built on similar lines to its well-known "Tungar" battery charger, for charging accumulators from alternating-current mains at home. Having an output of 0.3 amp., the device (fig. 1) is safe in use, and can be left in operation all night without any risk of damaging

Fig. 1.—B.T.-H. "Tungar" Trickle Charger.

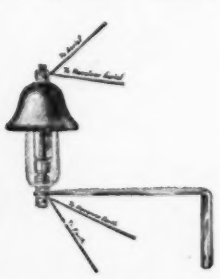


Fig. 2.—Philips' Automatic Lightning Arrestor.

the accumulator, or the device itself. It employs valve rectification, the valve, the only vulnerable part of the apparatus, being replaceable. It may be permanently connected to the accumulator to form an itegral part of the receiving set, and there is no need to disconnect the accumulator from the set for charging. When once the device has been installed, all that is necessary in order to commence charging is to switch off the filament current by means of either the battery switch, or the filament rheostat, and insert the adaptor into any convenient lampholder. No other connections of any sort have to be made, and, providing the charger has been connected correctly in the first place, there is no possibility of the accumulator being charged in a reverse direction. It has no moving parts, or chemicals, and requires no attention or adjustment whatever. It is manufactured in twelve different models.

A Lightning Arrestor.

Messrs. Philips Lamps, Ltd., are marketing an automatic lightning arrestor that is entirely independent of any outside agency for its successful operation. As fig. 2 shows, it consists of a tube filled with a rare gas and an adjustable spark gap, both being enclosed in a weather-proof glass container surmounted by a porcelain cowl which ensures dryness on the surface of the gaseous-discharge container, and so reduces the leakage loss. A stout galvanised-iron bracket is provided for fixing the device to a wall outside, the aerial being connected to the top terminal and thence to the aerial terminal of the receiver; the set is earthed through the bottom terminal of the arrestor. The latter is entirely automatic, not requiring to be "switched over," and its electrostatic capacity is very small, thus having hardly any effect on tuning adjustments.

A New Transformer.

Messrs. PHILIPS LAMPS, LTD., have introduced a l.f. transformer which is so designed that the amplification of frequencies between 200 and 10,000 cycles is practically constant, it is claimed, an important point for broadcast reception. As the amplification rapidly diminishes above 10,000 cycles, intermediate and high-frequency oscillations are not amplified. This transformer, although small, operates with efficiency when incorporated in a set with other first-class components. The ratio is 3 to 1 and the size of its base 3¼ by 1¾ in., and its height 2 in.

A Large Hospital Wireless Set.

An interesting example of a large-scale broadcast receiver installation has just been put into service at the Lodge Moor Isolation Hospital, Sheffield. It consists of a specially designed 9-valve Metro-Vick mains-operated receiver, together with an output distribution system connecting 40 loud-speakers and 400 pairs of head telephones throughout the hospital wards, administrative buildings, and staff quarters. Owing to the scattered arrangement of the buildings, the distribution connections involved the laying of no less than eight miles of wire. The equipment is operated from one central receiver (fig. 3) which has one h.f. stage, a detector, and two l.f. stages, the output stage consisting of six power valves with a common grid connection and separate outputs to feeder lines. The set is energised completely from the mains, being equipped with "Cosmos" a.c. valves, two l.t. battery eliminators which obviate the need for filament accumulators and six h.t. eliminators which obviate the need for replaceable, or rechargeable, batteries for the valve-anodes; the first h.t. eliminator also provides the grid-bias voltage for the output valves. In fig. 3 the h.t. eliminators may be seen below the receiver panel, the l.t. eliminators being located in the top compartment. The total power used in operating the set with the eliminators is about 300 watts, which (at the Sheffield

Fig. 3.—Metro-Vick Hospital Receiver.

tariff) costs about one penny for four hours' service. The total load is divided into six fairly equal sections, each of which is choke fed from one of the six output valves; the lines are single cables with earth return. The loud-speakers are directly connected in parallel, and may be used or disconnected independently. The telephones on each section are in series, automatic jacks being provided so that should any patient withdraw his, or her, telephones the supply to the rest of the ward is not affected. Volume control for the telephones in each ward is provided by a variable condenser in series. Using this method of telephone feed no device is necessary to compensate for the number of 'phones in use, there being very little difference in volume for a given condenser setting, whether two or thirty pairs of 'phones are connected. In addition to the arrangements for broadcast reception, the set is equipped with a gramophone pick-up for the reproduction of records, and with a microphone by means of which addresses, announcements, or urgent calls may be reproduced simultaneously throughout the hospital. The cost of the installation has been defrayed by subscription organised by the *Sheffield Independent* and the *Sheffield Mail*, this installation completing a series of seven Sheffield hospitals equipped for wireless reception through the efforts of the Sheffield Independent Press.

A D.C. Battery Eliminator.

Apparatus for energising the anode circuit of receivers directly from the domestic electricity mains, of almost ridiculous simplicity, was recently sent us to test, and we find it very satisfactory. It consists merely of three condensers, two lampholders (with lamps), a pair of graphite-covered bars with contacts at intervals making connection with a set of ten tapping plugs, and the necessary internal and external connections. The lamps are merely a safety device to take the full mains pressure in the event of a breakdown or "short." Two of the condensers (2 mF) are placed across the output connections, while the third, of similar size, is connected between the earth terminal of the set and the "earth."

The device was tested on 230-V mercury-arc-rectified current, the most unfavourable form of d.c. for the purpose, and after careful adjustment of plate voltage, grid bias and filament current, the hum was reduced to such an extent as to make it imperceptible during transmission, and just audible during the intervals. The tested sample was unprotected, and therefore not safe in inexperienced hands, but with a suitable cover the apparatus should prove acceptable.

The maker of this battery eliminator is Mr. E. J. BATY, of Luton, Beds.

Parliamentary News.

[By Our Special Parliamentary Reporter.]

Private Bills.

In the House of Commons, on July 4th, Mr. GILLETT, a Labour member, moved the rejection of the Weald Electricity Supply Bill. He said his remarks would also apply to the Wessex Electricity Bill, which was also on the Order Paper. He said that he wanted to obtain from the Minister certain information as to the general policy that the Government was following in connection with the granting of these large concessions. Of the two proposals now under discussion, the larger was that of the Wessex Electricity Company, a company which was started last year, and had powers over Oxfordshire, Berkshire, Wiltshire, Buckinghamshire, and Gloucestershire. The area covered some 6,000 square miles. The Wessex scheme asked for powers to supply a greater area. In putting his queries to the Minister, he accepted the position that the Government was working on the lines that the Electricity Commissioners looked impartially at private companies and municipal undertakings, and selected generating stations here and there, and received proposals for the enlargement of areas both from municipal and private undertakings, and gave their consent as they thought those schemes satisfactory. That had given the opportunity to certain financial interests to plan out large districts for the extension of electricity undertakings. He asked the Minister how far, when applications came before the Electricity Commissioners, the financial arrangements were considered. The position of the Weald Electricity Company was an extraordinary one, because the capital in that company was held by Callender's Share & Investment Trust, Ltd., which, in turn, was controlled by Callender's Cable & Construction Co., Ltd., which had connections with various electric light companies. One of the greatest difficulties in deciding what firms should be charged for power was that once companies became all mixed together in that way, the Government had no control whatever, nor could it have any check on the finances of those companies. Once they had electrical companies connected with companies that would supply the goods wanted by that electrical company, they had no check whatever upon the real financial position and standing of that company. If those companies came to the Minister and said that they could not afford to go on at the present prices charged for electricity, and must ask for a higher price, would the Minister feel that the claim was just? The House could not go on granting those large concessions.

Mr. WELLOCK, another Labour member, seconded the motion for the rejection.

Col. ASHLEY, the Minister of Transport, in reply, said that in many parts of the areas of those companies there was no prospect at all of making money. That was particularly true of the rural areas. Many of those companies had been for nine or ten years without any dividends at all. What Labour members were entitled to know was whether the entity—private company or municipality—which was given this territory to look after and supply with electricity was in a position to serve the public properly and well; whether the public interest was sufficiently secured by control of prices; and whether certain precautions were taken to see that the municipality or private company developed the area within a reasonable time. The Electricity Commissioners always made it their first duty to satisfy themselves that the financial status of the company or municipality was sufficiently good to justify their handing a concession over to it. In the case

of the Wessex Bill, he was assured personally by the Electricity Commissioners that they were fully satisfied that the company was in a financial position to undertake all its obligations under the Bill. Maximum prices were laid down, and when the Act of 1926 came into force, as he hoped it would within the next year and a half, or two years, there would be, in the Wessex area, a sliding scale of prices and dividends which would ensure that the public would not be exploited.

The Bill was read a second time.

The Wessex Electricity Bill was read a second time by 147 votes to 58.

The Cleveland & Durham County Electric Power Bill was also read a second time.

Interference with Broadcasting.

On July 3rd, Sir A. SINCLAIR asked the Postmaster-General whether, in view of the frequent interruptions to which users of wireless receiving sets were subjected in Wick and nearby districts by the Wick wireless transmitting station, he was yet in a position to state when continuous wave equipment would be installed in Wick in place of the present spark apparatus.

Sir W. MITCHELL-THOMSON said that extensive building operations would be necessary before the new equipment could be installed at the Wick station, and as the work of reconstruction must be carried out without interfering with the normal working of the station it would necessarily occupy a considerable time. The preparation of plans and specifications was at present in hand, and it was hoped to complete the work during next year.

Trinity House Electrical Work.

On July 5th, Mr. KELLY asked whether the Post Office staff was engaged on work for Trinity House on electrical communication with lighthouses and light vessels.

Lord WOLMER said that no Post Office staff was inclusively engaged on work for Trinity House. The communications with the Trinity House lighthouses were part of the public telephone system, and were worked and maintained by Post Office staff in the ordinary course. The wireless telephone installations on light vessels were not provided or worked by the Post Office.

The Reservoirs (Safety Provisions) Bill, 1928.

A Parliamentary Bill has been promoted with the object of imposing, in the interests of safety, precautions to be observed in the construction, alteration, and use of reservoirs, and of amending the law with respect to liability for damage and injury caused by the escape of water therefrom.

The Bill provides that any large reservoir shall not be built unless a qualified civil engineer (the constructing engineer) is employed to design and supervise its construction. As soon as he considers that the work has reached a stage at which the reservoir can be filled wholly or partially with water, he shall issue a preliminary certificate, which he may alter from time to time till he finally certifies the reservoir safe for the storage of water. Both certificates must specify the level up to which the reservoir may be filled and the conditions (if any) under which water may be stored in it. It is stipulated that to his final certificate the constructing engineer shall annex detailed drawings and descriptions containing full information regarding the works actually constructed, including dimensions, levels, and details of the geological strata or deposits encountered in trial holes or excavations.

The Bill also provides that undertakers shall cause any large reservoir to be inspected periodically by an independent civil engineer at intervals of not more than 10 years; and, if alterations are carried out which do not alter the capacity, but may affect its safety, then, unless a civil engineer is employed to design or supervise the alterations, the undertakers shall have the reservoir inspected on completion.

The undertakers shall publish the fact of the appointment of an inspecting engineer, also his name and his report; if they feel aggrieved by any of his requirements they may appeal to the Railway and Canal Commissioners. All certificates and reports shall be in the prescribed form and be kept by the undertakers, who shall publish the place where they may be inspected. The Bill provides that undertakers shall keep records of (*a*) water levels and depths, including the overflow over the waste weir; (*b*) leakages, settlement of walls and other works, and repairs; and (*c*) such other matters as may be prescribed.

On the application of any county, municipal, or metropolitan borough, or district likely to be affected by the escape of water from a reservoir, or of any person resident in or interested in property in any area likely to be so affected, the Railway and Canal Commission may make such orders as may seem to it to be required for safety. The Commission, if it considers that any undertakers have failed to comply with any of the requirements, may order that they shall forfeit a sum not exceeding £500, as the court may think fit.

When damage or injury is caused or threatened by the escape of water from a reservoir constructed before the commencement of the proposed Act of Parliament, the fact that it was so constructed shall not exonerate the undertakers from any indictment, action, or other proceedings to which they would otherwise have been liable.

The Bill provides for the formation of one or more panels of civil engineers, after consultation with the president of the Institution of Civil Engineers, if H.M. Secretary of State and Minister of Health so determine, any civil engineer appointed to which shall be deemed to be "qualified." The expression "large reservoir" shall mean one which is designed for, or capable of, holding more than five million gallons of water. It is stipulated that if the Bill becomes an Act it shall come into operation on January 1st, 1929, and shall not extend to Northern Ireland.

Wireless Licences.

On July 4th, Lord WOLMER, the Assistant Postmaster-General, informed Major CARVER that the number of wireless receiving licences in force was just over two and a half millions.

Correspondence.

Correspondents should forward their communications as early as possible. ***No letter can be published unless we have the writer's name and address in our possession.***

A New Use for the Portable Wireless Set.

I have at various times endeavoured to explain why it is that the deaf are able to hear so much better with a suitable broadcast radio receiving set than with one of the proprietary articles sold to the public as an "electrical aid."* In spite of this well-established fact, the deaf usually say that they would prefer an electrical aid to a broadcast receiving set, as the former enables them to attend theatres and concerts, and hear at least something of the performance.

There is no doubt that there is a great natural desire to use our two senses of sight and hearing simultaneously in our modes of recreation, hence the advent of the talking motion-picture film and other creations. I would therefore like to point out that the deaf can hear at a theatre, or concert, with the same strength and purity with which they are accustomed to listen to broadcast reception in their homes when certain opportunities present themselves.

The opportunities arise when the British Broadcasting Corporation broadcasts an opera, or play, which are, I am glad to say, fairly frequent. It would, of course, not be feasible to take an open-aerial type of receiving set to a theatrical performance, but now that portable sets have become so light and efficient these instruments can be used to advantage; there being, I understand, no objection to anyone taking such an article into a theatre.

It is a perfectly simple matter to operate such a set from a box, but anyone ought to be able to manage to operate it in any seat without much difficulty. During reception there is a perceptible lag between the original sound and the received sound, but a lapse of a second or so does not seem to be at all disconcerting to the deaf listener. The interval is really so small that the actions of the performers do not appear to be out of phase with the sound, while the original and received sounds do not intrude upon one another, as the listener who is already deaf has the protection of a pair of headphones over his ears which excludes all sounds other than those being received on the portable set. In this way the deaf may enjoy watching and listening to any performance being broadcast with the same ease as that of a person with normal hearing, or, in certain instances, better, for the acoustics of some theatres are not good, and in the case in question the deaf person has the advantage of not being affected by distance.

Charles M. R. Balbi,
Hon. Electrical Consultant,
NATIONAL INSTITUTE FOR THE DEAF.

London, *July 4th*, 1928.

Installation Costs.

We write this letter rather in the strain of an inquiry, as to whether your readers would advise us to go out of business on the strength of the following experience:—

We were recently asked to quote for one of the largest commercial organisations in this country, for dismantling the electrical installation at one of its shops, and installing a complete new installation on the screwed-conduit system. The shop was to be used during the whole of the work, which is quite a consideration in labour costs, yet we were cut out by a competitor who got the job at *£1* per point.

We consider that when one is told that a screwed installation is wanted, points must terminate in cast-iron boxes, switches be fixed in cast-iron boxes, and the conduit be screwed direct into fuseboards and switchgear.

If this is a true specification of a screwed job, I should indeed be interested to meet the man who can produce such

* See ELEC. REV., May 20th, 1927, "The Application of Radio Apparatus to the Relief of Deafness."

a job, using good quality materials, cables, switches, &c., at £1 per point, unless, of course, he mistakes himself for a philanthropic society.

The candid opinion of your readers would be very much appreciated.

Mortimer & Gall.

London, *July 6th*, 1928.

Small Circuit Breakers.

Referring to the letter published in the "Correspondence" columns of your current issue and to the description on the "New Electrical Devices" pages, may we point out that we too have for a number of years put on the market a similar small circuit breaker as per enclosed leaflet. The A.E.G. circuit breaker has the additional advantage of being suitable for both front and back connection. The apparatus is also fitted with a bimetal time-lag device rendering it suitable for use in connection with motors and large gasfilled lamps. An indicator window enables one to see at a glance whether the switch is "off" or "on."

A.E.G. Electric Co., Ltd.
(H. HORWOOD, *Supply Department*).

London, *July 9th*, 1928

Published Specifications.

Compiled expressly for this journal by a firm of Chartered Patent Agents. The numbers in parentheses are those under which the specifications will be printed and abridged and all subsequent proceedings taken.

1926.

18,439. "Treatment of bitumen and other materials adaptable for insulating or dielectric purposes." D. Anderson & Son, Ltd., and R. O. Child. August 16th, 1927. (291,858.)

31,272. "Electric annealing furnaces." Siemens-Schuckertwerke Ges. December 12th, 1925. (262,800.)

32,353. "Apparatus for transmitting views or images to a distance." Television, Ltd, and J. L. Baird. December 21st, 1926. (292,185.)

1927.

3,503. "Regulating or controlling systems for electric motors." N. F. S. Hecht. February 8th, 1927. (292,194.)

3,736. "Electrical distribution fuse-boards, fuse-boxes, and the like." Simplex Conduits, Ltd., and H. F. McLoughlin. February 10th, 1927. (292,195.)

4,660. "Thermionic frequency-changing or modulating devices, suitable for use in wireless telegraphy and telephony." E. W. B. Gill, and R. H. Donaldson. February 18th, 1927. (292,201.)

6,371. "Selective electric relays." Akt.-Ges. Brown, Boveri et Cie. March 6th, 1926. (267,158.)

6,744. "Mercury-vapour lamps." G. C. Aimer. March 10th, 1927. (292,215.)

6,865. "Thermionic valves." A. H. Midgley. March 11th, 1927. (Cognate application 10,207/27.) (292,218.)

6,866. "Thermionic valves and wireless receiving apparatus." A. H. Midgley. March 11th, 1927. (292,219.)

7,069. "Ratchet driving mechanisms." Automatic Telephone Manufacturing Co., Ltd., and S. R. Smith. March 14th, 1927. (292,224.)

7,070. "Time-recording apparatus." Automatic Telephone Manufacturing Co., Ltd., and S. R. Smith. March 14th, 1927. (Cognate application 9,353/27.) (292,225.)

7,082. "Switches and circuit-interrupters." G. A. Juhlin, and Metropolitan-Vickers Electrical Co., Ltd. March 14th, 1927. (292,226.)

7,121. "Current-collecting brush mechanism." E. A. Binney. March 14th, 1927. (292,232.)

7,171. "Electric circuit-breakers." A. Reyrolle & Co., Ltd., W. Anderson, N. Cooke, and B. H. Leeson. March 15th, 1927. (292,234.)

7,336. "Key-operated impulse-sending devices." Automatic Telephone Manufacturing Co., Ltd., and F. Tench. March 16th, 1927. (292,244.)

7,356. "Bayonet-pattern electrical connecting-devices." A. Bray, and G. Bray & Co., Ltd. March 16th, 1927. (292,246.)

7,456. "Electrical induction coils." L. Bronkhurst and C. S. Elliott. March 17th, 1927. (292,250.)

7,539. "Charge-indicating devices for use with electrical accumulators." A. R. Van Den Bergh. March 18th, 1927. (292,254.)

7,666. "Circuit-interrupting devices particularly applicable to telephone systems." Standard Telephones & Cables, Ltd. (G. Deakin). March 19th, 1927. (292,261.)

7,770. "Transformers." S. G. S. Dicker (Naamlooze Vennootschap Philips' Gloeilampenfabrieken). March 21st, 1927. (Cognate application 18,538/27.) (292,265.)

8,195. "Electric generators for the regulation of electric arc furnaces." Soc. d'Etudes et de Constructions Métallurgiques, and J. L. M. G. Grenet. March 24th, 1927. (292,272.)

8,283. "Electric time switches." J. Gunning. March 25th, 1927. (292,274.)

8,287. "Electric signalling systems." J. Lyons & Co., Ltd., A. Goddard, and G. Douglass. March 25th, 1927. (292,275.)

8,908. "Electric telegraphic systems." H. V. Higgitt, K. L. Wood, W. C. Hubble, and Eastern Telegraph Co., Ltd. March 31st, 1927. (292,281.)

8,956. "Automatic protective apparatus for electric mains." D. C. Redfern and F. Helling. April 1st, 1927. (292,282.)

10,658. "Electric signalling apparatus." A. Hattich and F. Kuhn. December 6th, 1926. (281,597.)

10,788. "Electric light switch adapter." C. H. West. April 22nd, 1927. (292,305.)

12,398. "Electric arc welding." W. M. Telford. May 9th, 1927. (292,318.)

12,836. "Electrical contacts." R. T. Waite and Electrical Appliances (Blackpool), Ltd. May 13th, 1927. (292,321.)

13,383. "Overhead electric conductors." A. Wiseman and W. C. Bunn. May 18th, 1927. (292,329.)

13,403. "Wireless telephony and telegraphy." W. F. C. Geraghty. May 18th, 1927. (292,330.)

13,469. "Telephone systems." Siemens Bros. & Co., Ltd., and D. A. Christian. May 19th, 1927. (292,331.)

14,944. "Means for fastening magneto high-tension cables to sparking plugs." W. H. Lawley. June 7th, 1927. (292,340.)

16,077. "Arc-welding apparatus." R. Sarazin. June 16th, 1926. (272,938.)

18,741. "Meters." Allgemeine Elektricitats-Ges. July 17th, 1926. (274,487.)

19,171. "Amplifying and recording telephonically-transmitted sounds." Dictaphone Corporation. July 22nd, 1926. (274,872.)

20,221. "Contact for concentric conductors." Siemens-Elektrowarme-Ges. August 10th, 1926. (275,967.)

21,095. "Continuous current transformers." Constructions Electriques De France. April 12th, 1927. (288,559.)

22,258. "Electric plug fuse." C. Greter. February 22nd, 1927. (285,826.)

23,205. "Electrically-operated lawn-mowers." D. H. Stokes. September 5th, 1927. (292,386.)

25,131. "Electric plugs and sockets." W. J. Pritchett. November 19th, 1926. (280,866.)

26,453. "Arrangement for reducing cross-talk in coil-loaded telephone conductors." Siemens & Halske Akt.-Ges. October 8th, 1926. (278,726.)

27,002. "Electric tumbler switches." J. A. Crabtree. October 12th, 1927. (292,399.)

28,982. "Incandescent cathode rectifier for medium voltages." Accumulatoren-Fabrik Akt.-Ges. January 4th, 1927. (283,129.)

29,660. "Directional wireless apparatus." Telefunken Ges. für Drahtlose Telegraphie. November 5th, 1926. (280,235.)

29,829. "Gas-discharge tubes intended for high voltages and provided with an incandescent cathode and a plurality of anodes." Accumulatoren-Fabrik Akt.-Ges. January 13th, 1927. (283,540.)

31,615. "Telephone systems." Associated Telephone & Telegraph Co. April 8th, 1926. (Divided application on 269,152.) (281,308.)

31,788. "Device for measuring the current densities of galvanic baths." Langbein-Pfanhauser-Werke Akt.-Ges. October 27th, 1927. (292,417.)

32,835. "Method of laying cables." Felten & Guilleaume Carlswerk Akt.-Ges. December 3rd, 1926. (281,724.)

32,985. "Coils for high-frequency induction furnaces." Hirsch, Kupfer- und Messingwerke Akt.-Ges. January 19th, 1927. (283,886.)

33,810. "Brake magnets for tramway and the like vehicles." A. Hanning (trading as Hanning & Kahl). December 14th, 1927. (292,421.)

34,938. "Means for regulating the terminal voltage of a generator." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. April 12th, 1927. (Addition to 264,891.) (288,565.)

35,484. "Electric insulators." Steatit-Magnesia Akt.-Ges. May 13th, 1927. (290,262.)

1928.

986. "Illuminating appliances." Holophane, Ltd. January 11th, 1927. (283,507.)

2,763. "Sparking plugs for internal combustion engines." J. Cooper and W. S. Pickard (trading as C. & P. Electrical & Plug Co.). January 28th, 1928. (292,434.)

3,475. "Devices for instantaneously striking the arc in arc lamps." Anciens Etablissements Barbier, Bernard, and Turenne Soc. Anon. August 19th, 1927. (Addition to 282,471.) (292,435.)

4,121. "Electric switching apparatus." Maschinenfabrik Augsberg-Nurnberg Akt.-Ges. March 12th, 1927. (287,045.)

4,539. "Telegraphic transmitters." British Thomson-Houston Co., Ltd. February 11th, 1927. (285,357.)

4,888. "Electrically-driven floor-polishing apparatus." S. M. Carlstedt. February 19th, 1927. (285,489.)

5,702. "Compound wound continuous-current dynamo-electric machines." Constructions Electriques de France. April 12th, 1927. (Divided application on 288,559.) (288,567.)

6,418. "Fishplates for railways or tramways." S. S. Wrightson and C. R. Matthews. March 1st, 1928. (292,444.)

9,825. "Telephonic and telegraphic transmission lines." Dr. E. Habann. April 1st, 1927. (288,184.)

Trade Mark Applications.

THE following are among the recent applications for British trade marks. Objections against any of the proposed marks may be lodged within one month from July 4th:—

Francoray. No. 486,833. Class 8. Apparatus for displaying signs by means of illuminated or light reflective surfaces.—The Franco-British Electrical Co., Ltd., 25, Oxford Street, W.1.

Ohmrad. No. 490,158. Class 8. Instruments and apparatus for use in radio-telegraphy and telephony.—Naamlooze Vennootschap Ramie Union, Entschede, Holland. (British representative: J. Martin Blair, Audrey House, Ely Place, E.C.1.)

Concord-Radio. No. 490,509. Class 8. Apparatus and instruments for use in radio-telegraphy and telephony and in television, and parts thereof.—A. E. W. Finch, 22, Swinburne Lane, Manor Park, E.12.

Weinaf. No. 490,585. All goods in Class 8.—Aktiebolag Nordiska Armatur Fabricken, Stockholm, Sweden. (British representatives: Haseltine, Lake and Co., 28, Southampton Buildings, Chancery Lane, W.C.2.)

Deac (lettering and design). No. 498,260. Class 8. Electric accumulators and parts thereof.—A.F.A. Accumulators, Ltd., 120, Tottenham Court Road, W.1.

Lion Radio Receivers (lettering and design). No. 491,133. Class 8. Radiotelephonic receiving apparatus. Holt & Lyon, 3, Station Parade, Balham, S.W.12.

Electrical Prospecting in Canada.

Electrical prospecting has been extensively practised in the exploration of mining claims, but there is considerable difference of opinion among mining men as regards its advantages, and the best system to be adopted. The Geological Survey of Canada has asked Messrs. J. B. Mawdsley and L. Gilchrist to undertake a study of electrical prospecting with a view to ascertaining the conditions under which the various methods and apparatus now in use can be successfully employed. These methods appear to possess considerable possibilities for locating mineral deposits, in areas where ordinary prospecting methods are applicable. Several methods have been developed, but there has not been time to demonstrate the capabilities of each. Endeavour will be made in the present investigation to collect information on this point. Field operations will be chiefly made in the Rouyn mining area of Quebec.

New Work for Contractors.

Particulars of new works and building schemes for the use of electrical installation contractors in search of work and all interested in the sale of electrical and allied plant and other products.

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

ALLOA.—Houses (100) for Town Council; burgh surveyor.

BEACONSFIELD (BUCKS.).—Housing scheme (25), for the U.D.C.; J. H. Crosby, surveyor.

BIRKENHEAD.—Four schools, for the Borough E.C.; Director of Education.

CAMBRIDGE.—Houses (69), for the T.C.; S. Foster, Ltd., builders, Bedford.

CHERTSEY.—Housing scheme (50), for the U.D.C.; E. J. Castle, clerk (returnable deposit of £1 1s.).

COLCHESTER.—Extensions, High School for Girls; Essex county architect.

DOVER.—Bank, for the Midland Bank, Ltd.; W. Nicholson (Leeds), Ltd., builders, Warwick Lane, London.

DUDLEY.—Works extensions, Hope Street; A. Leach & Sons. Works extensions, Dibdale Street; Scrim Manufacturing Co.

DUFFIELD (DERBY).—Artificial silk factory, Flaxholme Farm, for the British Brenda Silk, Ltd.

EARLESTOWN (LANCS.).—Additional 48 houses for the U.D.C.; surveyor.

EASTBOURNE.—Printing works, Trinity Place; A. J. Fellows, architect.

EASTHOPE (MUCH WENLOCK, SALOP).—Re-erection, after fire, of the parish church; vicar.

EDINBURGH.—Extensions (£2,000) at Animal Research Department for University; the principal.

ERITH.—Offices and laboratory, Station Road, for the Continuous Coal Carbonisation Co., Ltd.

FARSLEY (LEEDS).—Re-instatement after fire at woollen mills; W. Fowler & Sons, Ltd., Back Bottom Mills.

FIRBECK (ROTHERHAM).—Church, with electrical and heating work; Naylor, Sale & Woore, architects, Derby; Messrs. Greenwood, builders, Mansfield.

GALASHIELS.—Extensions, including nurses' home and X-ray department at Galashiels Hospital; medical superintendent.

GATLEY (CHESHIRE).—Church; rector.

GILLINGHAM (KENT).—Extensions to College of Commerce, Rock Avenue, for W. J. A. Knight-Rawlings; F. B. Hooper, architect.

GRAVESEND.—Additional 182 houses, King's Farm Estate, for the T.C.; J. G. Bennett, borough architect, 5, Woodville Terrace (returnable deposit of £3 3s.).

GRIMSBY.—School (£25,000), Nunsthorpe, for the Borough E.C.; director of education.

GUILDFORD.—School, Bellfields (£10,525), for the Borough E.C.; David Fry & Son, builders, Godalming.

HANWELL.—Extensions, Mental Hospital (£54,000); L.C.C.

HESTON & ISLEWORTH.—Houses, Heston Hall Estate (160); Perry Bros. (Ealing), Ltd. Heath Road (130); P. Chase Gardner & Co., architects. Ridgeway Road (40); F. W. Ferris. Bridge Farm Estate (152); W. J. Harris.

HITCHIN.—Extensions to Infirmary, for the B.G.; S. B. Russell, architect, Bank Chambers (returnable deposit of £3 3s.).

HULL.—Estate development, Chanterlands Avenue; Windross and Partners, Ltd.

LEEDS.—50 houses, Henconner Lane; W. Thompson & Sons. Rehousing scheme, Middleton Estate; city engineer. Reinstatement, after fire, of works; Leeds Metal Spinning Co.; Beaumont Parker, electrician, South Row, Hunslet.

LONDON (BARKING).—Reconstruction, Abbey Mills pumping station (£141,000); L.C.C. Engineer.

(BROMLEY, E.).—Nurses' home, St. Andrew's Hospital, Devons Road; R. A. Reader.

(ILFORD, E.).—Factory, New North Road; J. Aldridge. Factory, Grove Road; J. T. Luton & Sons, Ltd. 23 houses, Talbot Gardens; G. H. Marshall. 30 houses, Glenwood Gardens; A. Smith. 32 houses, Station Avenue; Seymour Construction Co.

(POPLAR, E.).—Building, White Swan beerhouse, Brunswick Street; W. Simms. Additions, London Graving Dock Co.'s premises, Orchard Place; Andrews & Peascod.

(BLACKWALL, S.E.).—Buildings, Tunnel Avenue and Blackwall Lane; John Ferguson, Ltd., biscuit manufacturers, Ashby-de-la-Zouch.

LONDON.—*Continued.*

(WOOLWICH, S.E.).—30 houses, Eltham Estate; borough engineer.

(WANDSWORTH, S.W.).—Two blocks of tenements, East Hill; J. E. Billings & Co., Ltd.

(WIMBLEDON, S.W.).—Housing scheme (44), for the T.C.; borough surveyor.

LUTON (BEDS.).—Re-erection of hat factory, Bute Street, for A. & F. Higgins (£30,000).

MAIDSTONE.—Extensions to Tovil Paper Mills, for A. E. Reed & Co., Ltd. Houses (21), Plains Avenue, for W. T. Burrows & Son.

MANCHESTER.—Rubber workshops, Newton Heath Technical School (£3,000); Education Committee.

MARKET DRAYTON.—Extensions to Institution for the B.G.; Campbell & Co., architects, Hanley.

MARKFIELD. — Joint sanatorium; Leicester county authorities.

MIRFIELD.—Re-erection of portion of Newgate Flour Mills, for Walker & Hollas, Ltd.

MORLEY.—Housing scheme (32); F. Turner, borough engineer (deposit £2 2s.).

NAPSBURY.—Hospital annexe (£4,000); W. J. Wiggs & Co., Radlett.

NORTHAMPTON.—Rest rooms and nurses' home, Gipsy Lane; Bethany Homesteads Institution Committee.

PETERBOROUGH.—Municipal offices (£40,000); borough engineer. Police and fire station; borough engineer.

PLYMOUTH.—Workshop and garages, Salisbury Road; F. J. and A. Coad.

PORTSMOUTH.—Children's home (£25,000), for the B.G.; clerk. New Hilsea College; Ellis Jones, headmaster.

ROCHFORD (ESSEX).—Housing scheme (50), for the R.D.C.; A. C. Madge, surveyor, Rayleigh (returnable deposit of £1 1s.).

RUGBY.—Re-erection of fittings factory, for the British Thomson-Houston Co., Ltd.

RUNCORN.—Houses (38), for the R.D.C.; Clough & Gaskell, builders, Wigan. Tannery extensions, Halton, for the Astmoor Tannery Co. Houses (205), Weston, for the Castner-Kellner Alkali Co., Ltd.

ST. HELENS (LANCS.).—Maternity home, Cowley Hill Lane (£11,000), for the T.C.; borough engineer.

SALFORD.—Housing scheme, 30 acres at Pendleton; Housing Committee.

SCUNTHORPE.—Housing scheme (50), Crosby Estate (deposit £2); W. Farrar, engineer and surveyor to U.D.C.

SEATON (DEVON).—Houses (24), for the U.D.C.; J. Ford, architect.

SHEFFIELD.—Sewage works (£134,000); city engineer. 46 houses, Longley Estate; M. J. Gleeson, Ltd. 100 houses by direct labour, Ridgway Estate; city architect. Workshops, Sharrow Grange (£4,500); city engineer.

SKETTY.—Mental hospital (700 beds), for the Swansea and Merthyr Tydfil Mental Hospital Visiting Committee; H. Carter Pegg, architect, 35, Parliament Street, Westminster, London, S.W. (returnable deposit of £5).

SMETHWICK.—44 houses, Thimblemill Road; G. Stubbings, Birmingham. Church, Abbey Road; Wesleyan trustees.

SPONDON (DERBY).—Art silk factory (£300,000); George Longdon & Son, builders, Sheffield.

SWANAGE.—Housing scheme (30), for the U.D.C.; surveyor.

TORQUAY.—Secondary school, St. Mary's, for Devon E.C.; secretary, Exeter. Additions, South Devon Hotel, St. Margaret's Road; Mrs. Colville Smith.

WADHURST (SUSSEX).—Roman Catholic church; E. Bower Norris, of Sandy & Norris, architect, 20, Bedford Row, London, W.C.; Connor Bros., builders, Crowborough.

WATFORD.—Alterations, cinema, The Parade; Purple Picture Palace, Ltd. Extensions, saw mills, Merton Road; W. H. Lavers & Sons.

WREXHAM.—Additional 32 houses, for the T.C.; borough surveyor. Houses (120), Charlestown Estate, for the Northern Trust Co., Ltd.

YORK.—Housing scheme (28), Tang Hall Estate; F. W. Surr, city engineer, Guildhall. 108 houses, Tang Hall; Flowett and Gilbert, Doncaster. Additions, Fishergate; Rankin Automatic Glass Feeder Co., Ltd. Factory, Hull Road; York Engineering & Foundry Co.